February, 1951

EDISON ELECTRIC INSTITUTE BULLETIN

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PUBLISHED MONTHLY BY EDISON ELECTRIC INSTITUTE

ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

October, 1949-1950

SOURCE AND DISPOSAL OF ENERGY—MONTH OF OCTOBER

	1950	1949	%
GENERATION* (Net)			
By Fuel Burning Plants	21,763,096,000	17,358,101,000	+25.4
By Water Power Plants	7,387,780,000	6,934,800,000	+ 6.5
Total Generation	**29,150,876,000**	**24,292,901,000**	**+20.0**
Add—Net Imports Over International Boundaries	83,974,000	63,663,000	+31.9
Less—Company Use	123,802,000	115,974,000	+ 6.7
Less—Energy Used by Producer	583,031,000	392,142,000	+48.7
Net Energy for Distribution	**28,528,017,000**	**23,848,448,000**	**+19.6**
Losses and Unaccounted for	4,097,021,000	3,539,754,000	+15.7
Sales to Ultimate Customers	**24,430,996,000**	**20,308,694,000**	**+20.3**

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of October 31st			
Residential or Domestic	37,253,972	35,117,187	+ 6.1
Rural (Distinct Rural Rates)	1,589,315	1,787,336	−11.1†
Commercial or Industrial:			
Small Light and Power	5,468,940	5,278,353	+ 3.6
Large Light and Power	235,906	231,891	+ 1.7
Other Customers	155,357	147,022	+ 5.7
Total Ultimate Customers	**44,703,490**	**42,561,789**	**+ 5.0**
KILOWATTHOUR SALES—During Month of October			
Residential or Domestic	5,482,420,000	4,749,418,000	+15.4
Rural (Distinct Rural Rates)	631,249,000	625,790,000	+ 0.9
Commercial or Industrial:			
Small Light and Power	4,321,322,000	3,876,484,000	+11.5
Large Light and Power	12,584,078,000	9,708,842,000	+29.6
Street and Highway Lighting	280,459,000	250,575,000	+11.9
Other Public Authorities	613,079,000	580,913,000	+ 5.5
Railways and Railroads:			
Street and Interurban Railways	279,449,000	288,827,000	− 3.2
Electrified Steam Railroads	196,988,000	181,566,000	+ 8.5
Interdepartmental	41,952,000	46,279,000	− 9.3
Total to Ultimate Customers	**24,430,996,000**	**20,308,694,000**	**+20.3**
Revenue from Ultimate Customers	**$435,281,900**	**$383,236,200**	**+13.6**

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—For 12 months ended October 31st			
Kilowatthours per Customer	1,801	1,664	+ 8.2
Average Annual Bill	$52.23	$49.25	+ 6.1
Revenue per Kilowatthour	2.90¢	2.96¢	− 2.0

* By Courtesy of the Federal Power Commission.
† Negative Percentage due to Reclassification.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 19 FEBRUARY, 1951 No. 2

How to Be a Good Boss

A Profile of What Makes a Good Big Boss, Good Little Boss or Just Plain Good Supervisor

By Willard V. Merrihue

Manager, Employee and Community Relations, Apparatus Division, General Electric Co.

Based upon an address before the First Hawaiian Conference, Pacific Coast Electric Association, Honolulu, Nov. 30, 1950.

THERE is an old Turkish proverb to the effect that "a dying fish first starts to stink at the head." To paraphrase this: "Show me the Big Boss of the outfit and I will tell you what kind of employee relations he has." I do not mean only the Biggest Boss of All—the chief executive of an outfit —but the lesser Mr. Bigs, the vice-presidents, the branch managers, the district sales managers, and all others who are the top men in the area in which they are situated.

If the boss leads instead of drives, if he has a real warmth and instinctive liking for people, if he is a regular guy, if he knows how to and does listen, if he surrounds himself with human beings who factor human relations considerations into their decisions, then his attitude will be reflected by his operating managers, his professional people, and all other members of management, including the all-important first-line supervisor—and you have the fertile climate for good employee or labor-management relations.

Results of Employee Poll

To be more specific, we learned through a poll of our employees several years ago that they wanted these nine elements in their jobs: good pay, good working conditions, job security, good bosses, fair promotion practices, respectful treatment, full information, belief in the job's importance, and job satisfaction.

It is profoundly important to note that with the exception of pay, working conditions, and job security, all the other things that our employees want in their jobs can best be supplied by their immediate boss. Therefore, a supervisor is a fairly important guy who deserves more than a promotion to bosshood and then eternal neglect. I think you will pardon me, therefore, if I talk a bit about "what makes a good boss tick," as measured by one company's specifications.

Profile for a Good Boss

Our profile for good bosses comprises these characteristics:

Adequate *technical knowledge.* They have the know-how to play short-stop if one of the team gets injured. This, however, is not quite as important as it was in former years.

Administrative ability. The good administrator knows how to analyze problems, organize the work, deputize the work force, and get things done efficiently and promptly; the good administrator will also set up definite goals for his people to aim at. Gerard Swope, our former president, and one of the world's best administrators, stated administration succinctly: "Analyze, Organize, Deputize, Supervise."

The *ability to lead.* He knows how to get things done *through* people, not *by* people. He can get the very best out of the group because they trust him and have confidence in him; they will follow his orders without a feeling of resentment.

They will do this because the leader has another priceless characteristic—

Social Insight. He has studied people. He understands the things that motivate people — and, understanding them, he knows how important it is to satisfy these motivations. He knows that his people are generally *motivated by two basic desires:* (1) One of these big yearnings is security. Security from hunger, from the climate, from physical danger; and here's one we usually forget, the security that comes from knowing what the boss expects of you, the security that comes from the praise of the boss for a job well done or prompt discipline for a sloppy job. (2) The other big yearning that motivates people is the desire for self-realization; to accomplish something worthwhile. This is the powerful force that motivates men to accept greater responsibility, to make suggestions, to stick their necks out constructively.

Assuming Responsibility

The good leader knows that most of his men won't take responsibility as long as they don't have security; that is, so long as they don't know what the boss expects from them or where they stand with him.

Those two things—the desire for security and the desire for self-realization —are two of the strongest drives attributed to human beings by the psychologists. And they can best be guaranteed to your people through high quality, human-relations-minded supervisors.

Another characteristic of a good boss is the ability to make *good* and *prompt*

decisions. If he is very, very smart, he will consult with his staff or his people —unshackle their minds and let them help him arrive at the right decision. But, right or wrong, he will make decisions as promptly as possible, knowing as he does that the lad who puts off decisions inflicts the deadliest of creeping paralysis on his work force.

A really fine leader of men is *dynamic*. He has a ceaseless gnawing ambition—not alone a *selfish* one for *personal* advancement—but a powerful propelling urge to try new ideas, new techniques, to blaze new trails—to find a simpler, better way to do old things. Like a great general, he'll take a chance at the proper time and set his followers afire by his optimism, faith and daring.

Good leaders have a deep sense of responsibility for their workers, for their own habits and actions, for their families, their community, and their company. Because of this maturity people find them steady, dependable. They know what to expect from day to day. And that gives followers a sense of security.

The good leader has *character*. This is an abstract thing but it can be likened to the steel framework of a giant skyscraper. Although not seen from the outside, it makes the building strong and safe.

For the last characteristic I have listed *personality*. This is the package—bright and inviting, or somber and forbidding —in which a man wraps up his personal characteristics and presents them for "sale," or "no sale," to the world. Anybody can, if he will try, develop a fairly attractive personality, simply by finding out what pleases people and then resolutely setting out to please them.

Improvement of Leadership

We've always had a lot of good bosses in General Electric but the significant point is this: We are now assiduously cultivating what formerly grew wild. Although we have been pecking away at the fringe of this problem for some time, we have just signed a contract with the Psychological Corp. of America to do a bang-up research job with us in better methods of selecting better supervisors for today's job.

But we can't wait 'til all the problem bosses retire so we are conducting a continuing program to improve present leadership.

First we are telling our bosses they must improve their *management manners*. When a man becomes a supervisor he is granted power—power over insecure people. Does he *grow up* or *swell up* with power? That is the first great test a man must meet in his ability to attract followers!

Even in this enlightened age of lip service to human relations, we find supervisors who have swelled up with power; who have low ethical standards; who practice petty tyrannies on their people. Their subordinates are sullen, hired mercenaries, not eager, resourceful followers—a pack of dogs in which never a tail wags—ready-made propaganda fodder for the self-seeking and subversives. Why should't they turn to the various "isms" if this kind of boss typifies democracy? And all the words in the world can't give a company staffed with that kind of leadership good employee relations.

Brush Up on Management Manners

Brushing up on management manners is a long step forward in developing loyal followers. Thinking of little human touches also works wonders.

Next, we tell our bosses, in our human relations training course, never make the mistake of thinking that the worker's need for security can be met simply by steady work, good pensions and insurance, or guaranteed annual wages. His *greatest* security must come from you.

Douglas McGregor, former head of the Industrial Relations Section of M.I.T., and now president of Antioch College, says that the boss who gives his workers the greatest feeling of security is the one who creates an "atmosphere of approval." This atmosphere is created not so much by what the boss does, but by the *way he does it* and his *underlying attitude toward his subordinates*. He goes on to say, it is relatively independent of the strictness of the supervisor's discipline or the *standards of performance* which he demands. Security for the rank and file is possible only when they know they have the genuine approval of their supervisor. A supervisor can create this atmosphere of approval by doing three simple things:

1. Letting the men know what is expected of them.

2. Letting the men know where they stand—"How'm I doing?"

3. Maintaining consistent discipline. Employees develop a real sense of security when they know that "right actions" will be praised and backed up —and that "wrong actions" will always be criticized or punished.

Some fellows, claims Dr. McGregor, try to substitute kindness for discipline. They try hard to be good felows—fail to maintain discipline or good standards of performance. Their people take advantage of the situation. The superior then begins to disapprove of his subordinates (even though he is to blame). He cracks down hard or else he grows more critical and disapproving. Because he fails to maintain discipline in an atmosphere of approval his followers feel insecure. Their work suffers and the boss says, "What the hell! There's nothing to this good-boss business!"

Kindness and Discipline

Every worker requires the security of knowing that he can count on the firm support of his supervisors for doing what is "right," and firm pressure (even punishment) for doing what is wrong. A *mild* discipline will get results in an atmosphere of approval, whereas harsh discipline can fail badly in an atmosphere of disapproval.

"Why all this namby-pamby business of giving the workers a feeling of security with the boss?" I almost hear some of you saying. Simply because the worker can't start achieving his second great yearning—self-realization or achievement—until he feels secure.

Thus, the supervisor who establishes the climate or atmosphere whereby this second great motivation of men can be tapped is really on his way to the races. This is where the gold lies.

Once the worker feels secure with his boss, he starts to blossom out, to develop himself, to seek responsibility, to stick his neck out constructively, to want to participate, to give out with good ideas, to achieve and accomplish.

Here we are then, at the meat of the cocoanut.

You have become a good boss—you have given your associates peace of mind —inner security. They are now ready to make you look great—to help you excel. How do you do it?

This brings us to communications. You take them into what amounts to a partnership of information. You show them that you and they have common

goals—to meet a budget of orders; to win back a customer considered lost; to cut down paper work in the office; to use time more effectively; to find new ways to cut costs and meet shipping promises.

And *always* — you talk things over with them.

Are you troubled with absenteeism? *Talk it over* with the offenders. Are you having a rush of grievances? Remember, a cup of water spiked with information will put out 90 per cent of all fires—*at the beginning.* Ninety per cent of potential grievances can be avoided by talking it over early enough.

Is the "going tough" on a new expense-reduction program? Talk it over with the employees.

If you are about to move a group into another building or office—talk it over with them in advance—invite questions—ask for suggestions.

If you want to help them believe that their jobs are significant, talk over with them the importance of their assignments and particularly try asking their advice on some problem. I know of one foreman who made a sweeper feel like a million dollars by asking him to look after a newcomer to the ranks and give him some orientation.

Cooperation Through Participation

Remember, the secret of good employee relations is first to get the workers' fullest participation, teamwork, ideas, to help him achieve self-realization—to *uncork* all the creativity and productivity stored up in him. The *corkscrew* is leadership.

Listen to what Mr. McGregor has to say about this: "Genuine cooperation among all members of an industrial family is *actually* quite possible. But it can only be given to emerge when the mechanisms of genuine participation become an established part of the organization routine."

What does he mean by "mechanism?"

I take it to mean two things: (a) a favorable atmosphere created by the supervisor to give the workers a feeling of security, and (b) some formalized procedure whereby the workers are given more of a chance to participate in the progress of their section.

The Employee Round-Table

Our formalized procedure or mechanism is the General Electric Employee Round-Table. In this procedure, the foreman or supervisor meets with his people periodically around a table in a conference room during working hours. He tells them how they're doing as a unit, what the backlog of business is, why better quality and cost reduction are vital for future job security. He may explain some recent policies of the company or new benefit plans. Then he throws the meeting open and asks for suggestions and questions. He is told never to bluff. If he doesn't know the answer, he must get it and deliver it to the questioner within 24 hours, if possible. He must keep minutes of the meeting and send them up the line until they get to the top manufacturing man so that there may be real two-way communication.

Effects of Round-Tables

These round-table or employee informative conferences not only build good bosses but they build good followers because they help the employees to achieve self-realization, a sense of belonging to the team, a new feeling of significance. They encourage each man and woman on the team to think.

Not long ago we made a study at our Erie, Pa., plant to see what our employees thought of these round-tables. Ninety-five per cent were overwhelmingly in favor of them—and here's why, in their own words:

1. Get to know the foreman better.
2. These meetings break down chasm between us and the foreman. (I wonder if most of you realize the chasm that's between many supervisors and their people. Wrong lift of the eyebrow —gruff absent-minded remark—sleepless night on the part of the employee —"I wonder what he meant?")
3. Lots of work methods are improved as a result of these meetings (suggestion system).
4. We get a chance to present problems to the foreman *when he has time to think.*
5. *We have a say in decisions.* We're surprised to learn that what we say is important.
6. *We get to know what everyone else does and why.* We get to *know what the whole thing is about.*

And there you have, summed up in words used by the employees, a simple formula for high morale on the part of the employees. More important, it is a sure-fire formula to employ in the developing of better bosses.

When we can get that kind of free-flowing two-way communication between each employee and his boss, we have at least the rudiments of a partnership between management and labor. It won't work unless your first-line supervision also meets regularly with their bosses.

So we established the "MIC," or Management Informative Conferences, with a regular full-time coordinator in each plant.

Finally, once a year, we insist that the Big Boss himself appear personally before all of his people and give an account of his stewardship. This is *some* job for the general manager of a large division such as a turbine, for example. To cover his 5000 people this fall, he had to appear before 17 different groups, a number of them on the graveyard shift. I ask *you:* Are we serious in this business of democratizing business?

In conclusion, I'd like to quote an old philosopher who once summed up all of man's life in these few words: "Filling what is empty, emptying what is full, and scratching when it itches."

It is only when we managers or bosses in business and industry today decide to take the time to fill that emptiness of the people that work with us through our kindness, consideration, square-dealing information, and any other devices which will give them an interest in whether the team wins or loses—that we can expect them to suggest and participate and then believe that free enterprise as practiced today is really a democratic institution.

1950-51 EEI Rate Book Announced

THE 1950-51 edition of the rate book, published under the direction of the Rate Research Committee of Edison Electric Institute, will be ready for distribution shortly. All rates effective to December, 1950, are included, if such were received here by December 1.

Residential, commercial and power rates in all cities of 20,000 population and over, not including municipal plants, are published in this edition, as well as the rates for a number of smaller cities where certain states would not be adequately represented under the 20,000 minimum. There is also included a listing of over 4000 cities, towns and communities where the rates are identical with those of a city reported in the book.

The price is $20.00 to member companies and $30.00 to non-members. Orders should be placed promptly so that a copy of the book may be sent immediately on publication.

A Lesson in Socialism

A letter to The Foundation for Economic Education from Thomas J. Shelly, teacher of Economics and History, Yonkers High School.

As a teacher in the public schools, I find that the socialist-communist idea of taking "from each according to his ability," and giving "to each according to his need" is now generally accepted without question by most of our pupils. In an effort to explain the fallacy in this theory, I sometimes try this approach with my pupils:

When one of the brighter or harder-working pupils makes a grade of 95 on a test, I suggest that I take away 20 points and give them to a student who has made only 55 points on his test. Thus each would contribute according to his ability and — since both would have a passing mark—each would receive according to his need. After I have juggled the grades of all the other pupils in this fashion, the result is usually a "common ownership" grade of between 75 and 80 — the minimum needed for passing, or for survival. Then I speculate with the pupils as to the probable results if I actually used the socialistic theory for grading papers.

First, the highly productive pupils—and they are always a minority in school as well as in life—would soon lose all incentive for producing. Why strive to make a high grade if part of it is taken from you by "authority" and given to someone else?

Second, the less productive pupils—a majority in school as elsewhere—would, for a time, be relieved of the necessity to study or to produce. The socialist-communist system would continue until the high producers had sunk—or had been driven down—to the level of the low producers. At that point, in order for anyone to survive, the "authority" would have no alternative but to begin a system of compulsory labor and punishments against even the low producers. They, of course, would then complain bitterly, but without understanding.

Finally I return the discussion to the ideas of freedom and enterprise—the market economy—where each person has freedom of choice, and is responsible for his own decisions and welfare.

Gratifyingly enough, most of my pupils then understand what I mean when I explain that socialism—even in a democracy—will eventually result in a living-death for all except the "authorities" and a few of their favorite lackeys.

Last Call!

MARCH 1, 1951

IS THE DEADLINE FOR ENTRY IN

CLAUDE L. MATTHEWS VALOR AWARD CONTEST

This is a last-minute reminder that the entries for the Claude L. Matthews Award for Valor must be received by the Secretary of the Edison Electric Institute not later than March 1, 1951.

Don't pass up this opportunity to gain well-deserved recognition for the individuals in your company who have shown outstanding devotion to duty during 1950.

Send your entry to:

EDISON ELECTRIC INSTITUTE
420 LEXINGTON AVENUE NEW YORK, 17, N. Y.

McCall's "My Kitchen" Contest Ties In With EEI Sales Materials

A KITCHEN-DESIGN contest, for women, that can be coordinated with the activities of the EEI "Range of Stars" promotion, Planned Lighting, and All Electric Kitchen programs, will get under way with a double page announcement appearing in the March, 1951, issue of *McCall's Magazine*, sponsor of the contest.

Asked to design "her own kitchen just as she would like to have it," each contestant will have to consider in her design all major kitchen and laundry appliances, electrical housewares, adequate wiring and lighting equipment, among many other items for kitchen use. Two top awards, among 107 cash prizes for amateur, professional and student, offer the winners $1,000, plus the complete installation of all kitchen appliances and equipment included in the winning design.

McCall's is offering its contest promotional materials, through the EEI, to electric companies with suggestions for tie-ins with the appropriate EEI sales materials. In addition to reaching housewives throughout the country by announcements and follow-up reminders in its magazine, *McCall's* has scheduled other announcements in the Home Service Bulletin that will go to 15,000 Home Economics teachers and field workers, sales executives and home service women of electric utilities, appliance distributors; and merchandise and appliance department managers of the top 300 department stores in the U. S. Forty appliance and kitchen equipment manufacturers are also relating their 1951 advertising to the "My Kitchen" contest.

Electric companies choosing to participate in the contest will have available to them both *McCall's* and EEI materials to advertise and promote the contest locally. Specifically, the EEI materials suitable for kitchen planning are: Planned Lighting bulletins, "The Kitchenizer's Digest," and "Dreams Come True When You Live Electrically." The electric companies may also aid local contestants by offering advice and assistance through their kitchen planning services, and by exhibiting model kitchen sales floor displays.

The contest will close on June 15 and the winners will be announced in the Fall, 1951, issues of *McCall's Magazine*. A letter containing information on the contest rules, procedures and promotional materials, along with a return postcard to request contest materials, has been mailed to electric light and power companies.

Accountants Look Forward to Annual Meeting

National Conference to Be Held in Chicago, April 23-25

THE national conference of electric and gas utility accountants, returning to Chicago for the first time since December, 1938, will be held at the Sherman Hotel, Monday, Tuesday and Wednesday, April 23, 24 and 25. The meeting is expected to attract a large attendance. A recurrent theme in the papers and reports to be presented will be the problem of maintaining good service and earning a fair return in spite of rising costs and manpower shortages due to the national defense program.

The Planning Committee has attempted to carry on the trend established last year toward emphasizing informality and spontaneity of discussion, rather than the lengthy reading of prepared papers. This does not mean, however, that a great deal of hard work will not be evident in many of the committee reports and other presentations that will make up the well-diversified program.

General Session

As in recent past years, the conference will open with a general session at 2 p. m., Monday, April 23. This year, all the principal speakers at the general session will come from within the electric and gas industries. They are: J. F. Oates, Jr., chairman, The Peoples Gas Light and Coke Company; E. L. Lindseth, president, The Cleveland Electric Illuminating Company; and A. F. Tegen, president, General Public Utilities Corporation. All of these men are well known as speakers who never fail to impress their audiences. The precise titles of the talks to be given by these three outstanding speakers have not yet been announced, but it is expected that Mr. Oates will deal with the broad subject of "human relations" in the public utility field; Mr. Lindseth will speak on what may be called "internal reporting" of accountants to general management, or the best way for the accountant to present the information essential to sound management decisions; and Mr. Tegen will offer some suggestions for "external reporting" by the accountant of financial facts to investors and customers.

On Tuesday there will be a series of parallel group sessions, each devoted to a particular field of accounting and with a program for each developed, in most cases jointly, by a standing committee of the Edison Electric Institute and American Gas Association. These sessions will be devoted, respectively, to General Accounting, Employee Relations, Depreciation Accounting, Internal Auditing, Materials and Supplies, Plant Accounting and Property Records, Taxation, and Customer Accounting Activities. At 12:30 the programs will continue in four luncheon sessions, one for General Accounting and one each for Customer Accounting, Customer Collections, and Customer Relations. Separate sessions will resume at 2 p. m. of the first seven of the groups just previously mentioned, although one or two of these may be closed sessions planned for committee members only. The three Customer Activity luncheon meetings, however, will continue as separate sessions in the same rooms where the luncheons are served.

At the date of going to press, not all of these groups have their programs completely set. Some of the proposed topics, however, are mentioned below:

General Accounting and Employee Relations

Messrs. L. C. Provencher, The Detroit Edison Company, and A. B. Dilworth, Northern Natural Gas Company, chairmen of the EEI and AGA General Accounting Committees, respectively, will preside jointly at sessions of the General Accounting group. A guest speaker, Mr. Carman Blough, research director of the American Institute of Accountants, has consented to talk on accounting trends. Following Mr. Blough's address by the subcommittee on Preservation of Records, entitled "Extraordinary Preservation of Irreplaceable Vital Records Under Emergency Conditions," Mr. O. K. Boyd, Consolidated Gas Electric Light and Power Company of Baltimore, will review briefly the proposed revision of the uniform system of accounts for electric utilities by the National Association of Railroad and Utilities Commissioners' Committee on Accounts and Statistics of Public Utilities which, as everyone knows, foreshadows similar changes for gas utilities.

At one of the Tuesday sessions the Accounting Employee Relations Committee will present Virgil K. Rowland of The Detroit Edison Company, who will talk on management inventory and development in the accounting department. Mr. Rowland is familiar with this subject in all its aspects, and he is well able to make an enlightening as well as an interesting presentation.

Depreciation Accounting

The opening sessions of the Depreciation Accounting Committee of the Edison Electric Institute, headed by Alex. E. Bauhan, Public Service Electric and Gas Company, as chairman, is expected to deal with three topics. One of these will be a review of recent significant court and commission decisions relating to depreciation accounting, presented by Maurice R. Scharff, consultant, a guest member of the committee. Another, it is now expected, will be a summary presentation of the results of a questionnaire, the purpose of which is to ascertain the details of actual depreciation accounting practices by representative utilities. The study will not concern itself with service life estimates or amounts of annual charges and reserves, but rather with the bases for determining periodic accruals of depreciation charges and adjustments of depreciation reserves data not now readily available from such compilations as the Federal Power Commission's annual report on "Electric Utility Depreciation Practices" or from any other source. A third topic for discussion is projected but has not yet been fully determined.

Internal Auditing

The Internal Auditing Committees, jointly presided over by H. R. Symes, The Detroit Edison Company, and P. J. Buzanga, Consolidated Edison Company of New York, Inc., chairmen of the EEI and AGA committees, respectively, have a full program planned

for three half-day sessions. On Tuesday morning, following a brief talk by the co-chairmen on the accomplishments of the Internal Auditing Committees to date and some of their plans for the future, there will be reports from each of the project committee chairmen with a discussion period. These will include a report on "Audit Manual Format" by W. T. Hofstetter, The Peoples Gas Light and Coke Company; a report on "Compilation of Case Histories" by J. K. Laurentz, The Brooklyn Union Gas Company; and a report on "Audit Manual of Accounts Receivable" by C. J. Nichols, Consolidated Gas Electric Light and Power Company of Baltimore.

On Tuesday afternoon there will be an informal round table discussion which will bear the program title "Internal Auditing Shop Talk" and will deal with all kinds of internal auditing problems. At least ten main topics are ready to be presented for discussion.

The Wednesday morning session, at which W. T. Hamilton, The Cleveland Electric Illuminating Company, will preside, will be devoted to the general topic "How May the Internal Auditor Serve His Company." The answer to this question will be presented in three papers: "Internal Auditing's Part in Training," by E. R. Mellon, Washington Gas Light Company; "Evaluation of Performance of Operations and Personnel," by A. J. Gregory, Wisconsin Electric Power Company; and "Internal Auditor's Determination of Compliance with and Valuation of Established Policies and Procedures," by J. D. Hogan, Michigan Consolidated Gas Company.

Materials and Supplies

The Materials and Supplies Committee of the AGA, with O. G. Peterson, New York States Electric and Gas Corporation, as chairman, will hold open sessions on Tuesday and Wednesday, both morning and afternoon. The Tuesday morning session will open with a brief report by the Standard Packaging Subcommittee, followed by a panel discussion in three phases: "Stores Operations," "Stores Accounting," and "Purchasing." This panel discussion is expected to carry through Tuesday afternoon. On Wednesday morning there will be a paper or report on "Material Handling Equipment," and on Wednesday afternoon one on "Simplification of Stores and Accounting Operations," which will be mainly devoted to accounting for minor materials.

The two standing committees will meet jointly with EEI chairman C. E. Raines, Niagara Mohawk Power Corporation, and AGA chairman H. G. Eilers, The Cincinnati Gas and Electric Company, presiding. They contemplate papers for Tuesday morning on "Capitalization of Overheads" (prepared in collaboration with the General Accounting Subcommittee dealing with the same subject), "Plant Accounting Cost Simplification," and "Machine Accounting for Detailed Plant Records." Either Tuesday morning or Wednesday morning, the committee expects to present guest speaker F. Joseph Rachor, of the Cleveland office of Arthur Andersen & Company, whose subject will be "Adapting Plant Accounting Records to Depreciation Study Requirements."

Taxation Accounting

The two standing committees on taxation are planning an open session either Tuesday or Wednesday, which will feature a paper by Leo A. Diamond, of Chadbourne, Wallace, Parke & Whiteside, on some of the more important and interesting aspects of the new excess profits tax law. There will also be a review of recent tax rulings, legislation, and other tax matters of general interest and significance, by J. R. Weger, Consolidated Gas Electric Light and Power Company of Baltimore, and a discussion by W. S. Alt, Union Electric Company of Missouri, on some recent significant tax cases. EEI chairman Charles Wigand, Commonwealth Services, Inc., and AGA chairman R. M. Dodds, Ebasco Services Incorporated, will preside jointly.

The Customer Activities group of standing committees, for which R. B. McCrorey, Georgia Power Company, and C. L. Havener, Consolidated Edison Company of New York, Inc., act as coordinators for the EEI and AGA, respectively, plan as usual a varied program for discussion of up-to-the-minute problems in the field of Customer Accounting activities.

On Tuesday morning, as already stated, the entire Customer Activities group will meet as a whole. At this meeting A. W. Merchant, Michigan Consolidated Gas Company, will offer a project committee report on short cuts and improved methods, probably entitled "New Solutions to Customer Accounting Problems." Another project report, "Collection Follow-up by Telephone," will be given by R. B. Mitchell, The Peoples Gas Light and Coke Company. The morning session will conclude with a third report bearing the intriguing title of "Three P's in a Pod," devoted to the thesis that good policies, procedures and personnel make good customer relations.

The Customer Accounting luncheon meeting will take the shape of an open forum presided over jointly by J. O. Hill, New England Power Service Company, and J. C. Luchsinger, The Cincinnati Gas & Electric Company. The basis for discussion will be interim reports on long-range problems, probably including "Improving Meter Reading Efficiency," "Operations Involved in Handling Cash Receipts," "Centralized vs. Decentralized Billing and Accounting," and possibly "Meeting the Manpower Shortage" and "Preservation and Protection of Customer Accounting Records." There may also be a brief interim report by the project committee on "Directory of Customer Accounting Methods and Equipment," outlining the committee's ideas on how best to keep this valuable study up to date.

Customer Collections

The Customer Collections luncheon, jointly presided over by F. J. Flom, The Detroit Edison Company, and H. S. Hahn, The Ohio Fuel Gas Company, will have as a guest speaker Kenneth R. Wells, vice president, American National Bank and Trust Company of Chicago, and instructor in Credits and Collections at Northwestern University, who will give a talk, the title of which has not yet been announced, but which will probably deal with some phase of collection psychology. At this meeting also, G. A. Kunz, Consolidated Edison Company of New York, Inc., will describe the mobile collection unit in use by that company, and Mr. Hahn will show pictures of his company's drive-in pay stations. The Customer Collections group may also expect to hear interim reports on some of the committee's long-term projects, probably including "Authorized Pay Station Practices" by W. E. Travis, The Cleveland Electric Illuminating Company; "Collection Treatment of Final Accounts," by G. A. Wilson, Public Service Electric and Gas Company; and "Better Collection Letters," by D. M. Arnold, Pennsylvania Power Company.

(*Continued on page* 52)

Electric Arc Furnaces—Problems and Solutions in Power Supply

By B. M. Jones
Planning Engineer, Duquesne Light Company

A paper presented before the EEI Electrical Equipment Committee Meetings, Cincinnati, Ohio, Feb. 13-14, 1950, and Old Point Comfort, Va., Oct. 9-10, 1950

This article is in two parts, both complete in this issue. In Part I the writer describes the problems involved in handling large electric arc furnace loads, and Part II covers the solutions used on the Duquesne Light System over the past several decades.

Part I—The Problems

THE electric arc furnace produces very violently fluctuating loads, and—depending upon the size of the furnace and the size of the electrical system to which it is connected, taking cognizance of the point at which it is connected to the electrical system—is, in many cases, a most serious problem involving large expenditures. The method of connecting such loads should be carefully engineered to insure satisfactory operation, both to the furnace customer and to the electric company's other customers.

Calculation of Voltage Flicker

The correct engineering approach is to determine in advance what the kilovolt-ampere swing and resultant voltage flicker will be, and to provide a suitable system connection with corrective equipment, if necessary, to keep the voltage changes within tolerable limits. However, this is not always so easy, for in the past it has been rather difficult to find out just what the electric performance of the furnace would be. Fortunately, a number of data is now available in several trade publications to provide a good guide, and these are listed in the bibliography at the end of this paper.

There are many factors involved, and many calculations to be made, not only for normal system conditions, but also for the abnormal system condition of reduced generating capacity, lines out of service, etc. These abnormal conditions may result in voltage disturbances beyond tolerable voltage limits, may adversely affect generating station operation, and may also result in voltage unsuitable to the furnace customer.

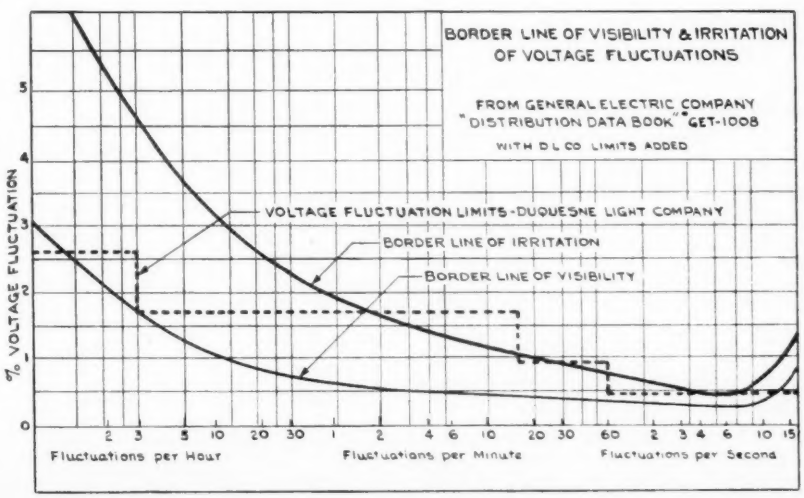
The Problems Involved

Briefly, there are four major problems involved:

1. To provide adequate line and/or stepdown transformer capacity to carry the heating load that the furnace imposes thereon.
2. Similarly, to provide adequate line capacity to handle the violent one- and three-phase load swing and deliver usable voltage.
3. To connect such line extensions into the system at a suitable location to avoid: (a) subjecting other customers to objectionable flicker, and (b) causing objectionable operation of various equipment on the system, such as induction-feeder voltage regulators, governing equipment, tie-line controls, rotating equipment, etc.
4. To reinforce the system and/or lines as required.

Voltage Flicker Standards

Duquesne Light has voltage flicker standards, which are shown in Fig. 1, and these apply to various types of utilization apparatus that produce disturbing fluctuating loads such as those listed earlier in this paper. The voltage flicker is of more concern to our company on the 66-kv system in certain zones of frequency of occurrence than for other parts of the system, because the cost to provide corrective measures would be greater than on other parts of the system. Even though the same perceptible and objectionable zone will exist, more consumers would be exposed to the voltage flicker, and hence presumably more complaints would result. By adhering to these limits for 10 years, we have encountered very few complaints because of voltage flicker, and the few have been mainly the result of welder installations rather than furnace installations.


BORDER LINE OF VISIBILITY & IRRITATION OF VOLTAGE FLUCTUATIONS
FROM GENERAL ELECTRIC COMPANY "DISTRIBUTION DATA BOOK" GET-1008
WITH D L CO LIMITS ADDED
VOLTAGE FLUCTUATION LIMITS-DUQUESNE LIGHT COMPANY
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1
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2 3 5 10 20 30 1 2 4 6 10 20 30 60 2 3 4 6 10 15
Fluctuations per Hour
Fluctuations per Minute
Fluctuations per Second

Fig. 1—Flicker Chart

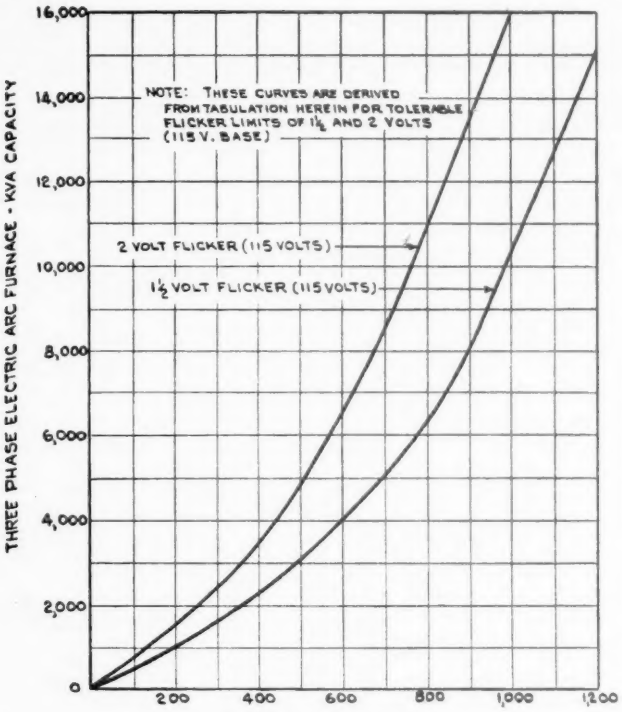

Fig. 2 (Left)—Size of System Expressed in Short Circuit MVA Necessary for Serving Three-Phase Electric Arc Furnaces

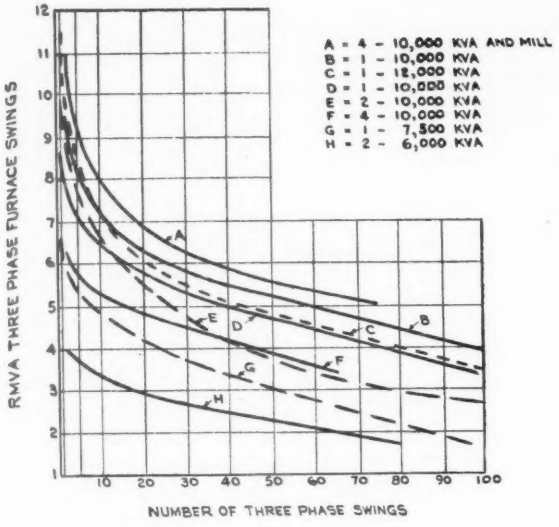

Fig. 3 (Above)—Number of Instantaneous Three-Phase RMVA Swings during a Period of Four to Six Hours, Including Meltdown for Various Sizes of Furnaces Individually and in Groups

Furnace swings in relation to the size of the furnace transformer are shown in the following table, and were obtained from published matter and from our test data.

Furnace Transformer N.P. Rating—kva	1-Phase Swing—kva	P.F. —%
2,000	2,300	43
3,000	3,100	46
4,000	3,800	47
5,000	4,300	50
6,000	5,000	52
7,500	5,600	55
10,000	6,500	60
12,000	7,000	63.5
15,000	7,750	68.5
16,000	8,000	70

Three-Phase Electric Arc Furnaces

Fig. 2 shows our ideas of the size of the system in short circuit kva for supplying 3-phase electric arc furnaces, this short circuit kva being at the point on the system where the 1.5 or 2.0-volt flicker will occur. These curves are based upon single-phase furnace swings shown in the table above, and represent a general guide, and, further, they are based upon the relation between the resistance and reactance of the system at the points where these flickers occurs. Of course, individual applications should be engineered in a "tailor-made" manner.

Fig. 3 shows the frequency of instantaneous 3-phase reactive megavolt-ampere swings for various sizes of furnace, and in several tests made it has been disclosed that the highest swing occurs only once in a six-hour heat, and that the next 10 high swings are less than 80 per cent of this one value. This case was on a 10,000-kva furnace transformer, and we have data on larger units which approximately bear this out. The objectionable zones of voltage flicker previously referred to are more likely to be in the latter range than for the one or two infrequent higher swings.

Infrequent and Lower Swings

A study of Fig. 3 will show the steepness of the curve for the infrequent swings, and the lower swings—or more infrequent ones—will probably not require so stiff a system and hence will probably require less material. We doubt the advisability of tooling up for the one or two maximum swings during a heat of even one or two hours, let alone for the one large swing occurring in a six-hour heat during wartime.

The maximum swings produced by several furnaces in simultaneous operation in one plant occur very infrequently. In fact, our investigation discloses that they are of less frequent occurrence than the one high swing of one furnace operating alone. In specific tests on an installation of four 10,000-kva furnaces in the same plant, the increase of the maximum swings of two furnaces, when operating simultaneously melting down, over one alone was about 20 to 25 per cent. Similarly, for the three similar furnaces over two, the increase was 7 to 10 per cent additional.

These records of Fig. 3 were obtained from high-speed graphic meter charts at 3 and 6 in. per minute, and it is recognized that there is some error in these charts because the swings take place so rapidly the instrument cannot follow them accurately. The oscillograph is the proper measuring device to use to obtain such records, but it is believed that these curves are indicative of the general relation.

Single-Phase Swings

It is also recognized that the lamp flicker, the source of complaints, is the result of single-phase swings, but the single-phase data were not available. However, it is believed that the 3-phase data will be indicative of the general relation between single-phase swings of different size furnaces.

The swings are affected very materially by type of scrap and by how the furnace is operated. For instance, a large furnace was tested at one time which was charged with light scrap loosely packed in, with the resultant swing being about half or two-thirds of those on similar furnaces when charged

with heavy scrap carefully packed in. Also, the amount of supplemental reactance (the tap connection of the reactor) in use in the furnace transformer has a very material bearing on the magnitude of the swings. Therefore, caution is urged in attempting to use these curves as a criterion of furnace performance, but they will be helpful as a guide.

The furnace sizes on Duquesne Light's system range from 500 kva to 15,000 kva. The first steel melting furnace supplied by the public utility system was installed on the Duquesne Light System in 1908, and was then supplied by a separate engine-driven generator and an exclusive transmission line. Later, as the system became larger, the furnace was supplied from the transmission network. This furnace was replaced in 1920 with a larger one, and several additional furnaces have been installed in this same plant. There are other power companies with more electric steel melting furnace loads than Duquesne Light has, and a number of them have larger furnace transformers.

Part II—The Solutions

The various methods of connections developed and used by the Duquesne Light Company for 28 electric arc furnaces in 13 plants, varying in size from 1500 to 15,000 kva, and totaling 145,000 kva are shown in Table I. This table shows the number of furnaces, the largest furnace transformer, the supply voltage, short circuit duty and reactance at the customer's incoming bus, and the voltage flicker at several locations—these latter being very important.

There are many smaller furnaces on the Duquesne Light System—down to 500 kva—and the total of all electric arc furnaces now on our system amounts to approximately 170,000 kva. Several larger furnaces are in prospect.

Age of Installations

One of these installations has been in service since 1916, others being added from time to time in new and existing plants, and the larger installations have been made within the last 10 years. The earliest furnace on Duquesne's system was installed in 1908, and it was a real problem.

Basis of Data

The data on the 28 furnaces in Table I are based on the 1943 system generating capacity (N.P.) of 624 mw; now the generating capability is 802 mw with two additional 80-mw units authorized, which will make a system capability of approximately 1000 mw. Of course, larger furnaces can be handled satisfactorily on the larger system, and the present furnaces produce less voltage disturbance.

Some of the more interesting of these furnace installations and their solutions are described in detail below, and factors to be considered in connecting such loads follow the descriptions of the connections for the various plants.

Plant A—Fig. 4

These two 15,000-kva furnaces and one 10,000-kva furnace are connected to a steel company's 66-kv, 60-cycle system which interconnects with the Duquesne Light 66-kv system at our substation. Two 4/0, 66-kv Duquesne Light lines tie into this substation. Proposed load increases necessitate two additional 4/0 66-kv lines in 1951.

These furnaces are located about 1½ miles from this substation, and Duquesne Light has received no voltage complaints from this source, although we do know when these furnaces are operated by the load swings on the system. Duquesne Light has been interconnected with this steel plant since 1938.

The steel company has had smaller electric arc furnaces in operation for a great number of years, supplied at 25 cycles by their own generation system, and they interconnect with their 60-cycle system through a 20-mw electronic frequency changer. Duquesne Light encounters no trouble from this 60/25-cycle interconnection.

Plant B—Fig. 4

This customer was connected to Duquesne Light's 66-kv system by one 1/0, 1.6-mile, 66-kv line extension, the shortest possible route. This was purely a reduction plant with no fabricating or rolling mill equipment, and, with the good line performance of the 66-kv line, to which the short extension was con-

TABLE I—1943 TRANSMISSION SUPPLY LINES, SHORT CIRCUIT KVA, AND VOLTAGE FLICKER—28 FURNACES FROM 1500 KVA TO 15,000 KVA IN 13 PLANTS ON DUQUESNE LIGHT SYSTEM

		Furnace Transfs.		Line Data		At Incoming Bus			Regulation Based on Inst. Est. 1φ Kva Swing: At Cust. Substa.		Regulation Based on Inst. Est. 1φ Kva Swing: At Nearest Critical Station Bus
Plant	Fig.	No.	Largest Transf., Kva	Voltage, Kv	From Network or Separate Line	3φ Mva Short Circuit	Reactance in Ohm or Imp. 3φ	Reactance in Ohm or Imp. 1φ	At Incoming Bus	At Furnace H.T. Bus	
A	4	3	15,000	68	NW	1,179,000	3.925	7.85	1.53	4.80	1.22
B	4	2	10,000	68	NW	749,000	6.18	12.36	2.00	5.98	.98
D	4	4	10,000	68	Sep.	304,000	15.22	30.44	4.92	7.55	1.23
E	5	1	7,500	23	NW	439,000	1.205	2.41	2.99	2.99	2.56
J	6	1	7,500	23	Sep.	132,000	4.01	8.02	9.94	9.94	2.75
C	4	2	6,000	68	Sep.	330,000	14.02	28.04	3.52	10.50	1.78
G	6	4	5,000	23	NW	388,000	1.33	2.66	2.60	2.60	1.28
H	5	1	5,000	23	NW	165,000	3.21	6.42	6.27	6.27	2.17
F	5	2	4,000	23	Sep.	103,000	5.12	10.24	8.70	8.70	1.76
K	5	1	3,000	23	NW	319,000	1.656	3.31	2.34	2.34	1.87
L	6	3	3,000	11.5	Sep.	364,000	.363	.73	2.02	2.02	1.48
M	8	2	2,500	23	NW	238,000	2.22	4.44	2.75	2.75	1.04
N	8	2	1,500	23	NW	339,000	1.56	3.12	1.36	1.36	1.02

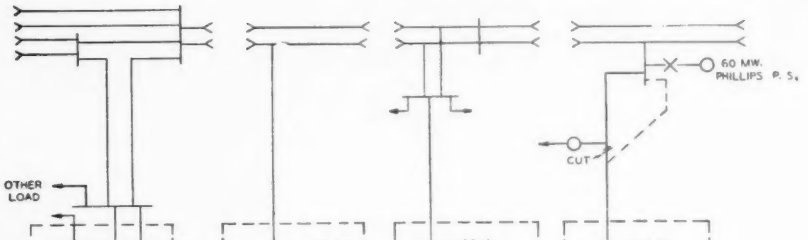

Fig. 4—66-Kv Line Connections for Electric Arc Furnaces of 6000 to 15,000 Kva, 1943, 624,000 Kw Generating Capacity

nected, adequate continuity of service was rendered.

This was a war plant, and hence the minimum amount of materials was used and only one 66-kv line installed. It has been shut down since the war.

Plant E—Fig. 5

One 7500-kva furnace was installed in an existing steel plant without other furnaces, which plant was supplied by three short 22-kv lines about 3.0 to 3.5 miles long. The furnace was connected to the 22-kv bus so that a 22-kv bus tie breaker could isolate the furnace only from the rest of our 22-kv system in this vicinity, and then supply the furnace from a direct 4/0, 22-kv, 3.5-mile line from the Ambridge Substation.

This bus tie was opened only during the meltdown periods, and this was an hour or so out of the 4 to 6 hours' time for a complete heat. The remainder of the time was the refining period, when the load was much steadier and we could tolerate the small flickers in the 22-kv system in the vicinity of that plant, so the 22-kv bus tie was closed.

About two years later, a second 7500-kva furnace was installed and similarly connected, and after adjusting the reactance and voltage taps in both the furnace transformers, the necessity for opening the bus tie breaker was eliminated and it has been run closed practically all the time since.

Two 10,000-kva furnace transformers are scheduled for 1951, to replace the two 7500-kva units, because the furnaces require these larger transformers for maximum production. This will require Duquesne Light reinforcing this 22-kv bus. A 30,000-kva, 66/22-kv substation nearby is planned for 1951 for other area load growth as well as for supplying these larger furnace transformers.

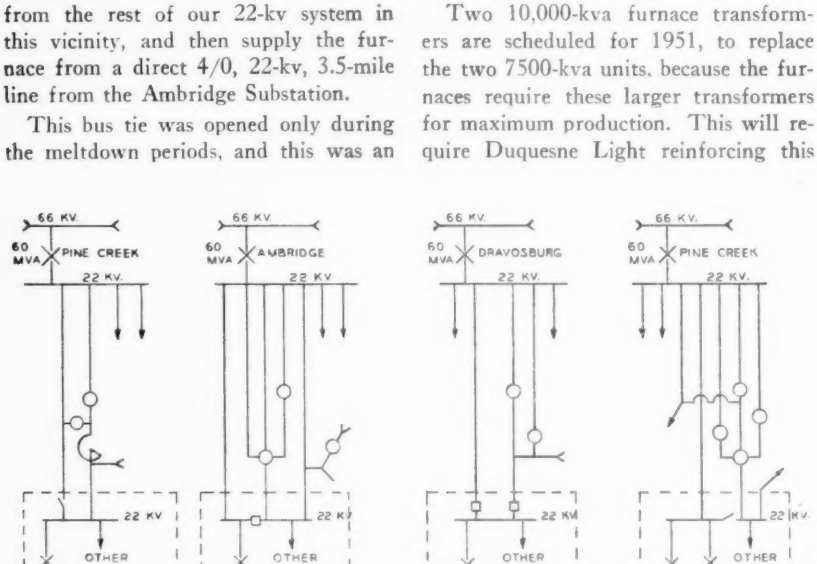

Fig. 5—22-Kv Lines for Electric Arc Furnaces of 1500 to 7500 Kva, 1943, 624,000 Kw Generating Capacity

Plant C—Fig. 4

This customer was connected to a 4/0, 66-kv line about 8 miles long which terminates on Duquesne Light's Valley 66-kv bus. This was before the first generator was installed in the Phillips Power Station.

The installation has been quite satisfactory, and the degree of service continuity rendered from this single supply has been entirely adequate as this, too, is purely a reduction plant. The customer has his other steel and pipe plant activities in an adjoining plant supplied from Duquesne Light's 22-kv system.

The strength of the Valley 66-kv bus has been increased since this installation was made, due to providing another 66-kv line into the district and by the installation of Phillips Power Station—now 234 mw capability.

This customer is planning to install two additional 12,000- kva furnaces in 1951. The present 4/0, 66-kv line will be adequate for this installation, but additional transformer capacity at this plant may be required. No trouble is expected from the resulting flicker.

Plant L—Fig. 6

This plant, with three 3000-kva furnaces, was a wartime project, and the government agency, the Navy, I believe, insisted that there be two separate and exclusive 11-kv underground cables to it. Accordingly, two exclusive 500-MCM lead-covered cables, 0.8 miles long, were made available by cutting and rearranging the existing cables, and this operation was satisfactory.

This furnace plant has since been shut down.

Plant H—Fig. 5

Initially this 5000-kva furnace was connected to the customer's 22-kv mill bus. This caused a considerable number of voltage complaints over a widespread area, and several steps were taken in solving the difficulties. One immediate step was to adjust the primary relays of the induction feeder voltage regulators on the 4-kv regulated lighting circuits in many substations by spreading the contacts farther apart and providing

more time delay. A second and later step was taken to provide remote control on the 22-kv line breaker on the righthand side of sketch, Fig. 5, so that it could be opened from Dravosburg Substation (attended), thus leaving the customer supplied by a 4/0, 3.0-mile, 22-kv line from Dravosburg Substation during the violent fluctuation of the meltdown period for an hour or so. This relieved the rest of the 22-kv system in this vicinity of objectionable voltage flicker, as the Dravosburg 22-kv bus was stiff enough to handle these fluctuations. Even today, with Dravosburg reinforced, this isolation move is taken when the meltdown is particularly rough.

Plant F—Fig. 5

There was a 1500-kva furnace in this plant previously which had given no trouble for a number of years, and which was tied to the regular 22-kv plant bus in the plant along with their other load.

Later, a 4000-kva furnace was installed and it was necessary to install an isolated disconnecting switch in the 22-kv plant bus and operate it open to prevent the flicker from the larger furnace causing complaints from the nearby residential customers. These two furnaces were thus isolated on a radial 4/0, 22-kv line, 5.5 miles long, from the Pine Creek Substation. This radial line was provided by cutting and rearranging the 22-kv lines in this area.

This method of operation is now quite satisfactory, and we receive no voltage complaints, although the load fluctuations are noticeable on the Pine Creek bus which is rigid enough to handle them.

For maintenance, repairs, and for line breakdowns, this switch is closed and the 4000-kva furnace is operated at sufficiently reduced secondary voltage so that no voltage complaints come from customers. Such instances are rare, as maintenance and repairs are scheduled to suit the customer's convenience, although, of course, line failures are rarer and unpredictable, and we just take them as they come.

Plant D—Fig. 4

This was, and is, a most interesting installation.

The initial 10,000-kva furnace was connected in early 1940 by an 8-mile, 4/0, 66-kv line extension from the Duquesne Light 66-kv system, and a 9375-kva, 66-kv power bank was installed. Later, in 1940, a second 10,000-kva furnace was installed and an 11,610-kva power bank installed. Then a year or two later, two additional 10,000-kva furnaces were installed, and we just added two more 11,610-kva power banks, and paralleled all banks on high and low sides.

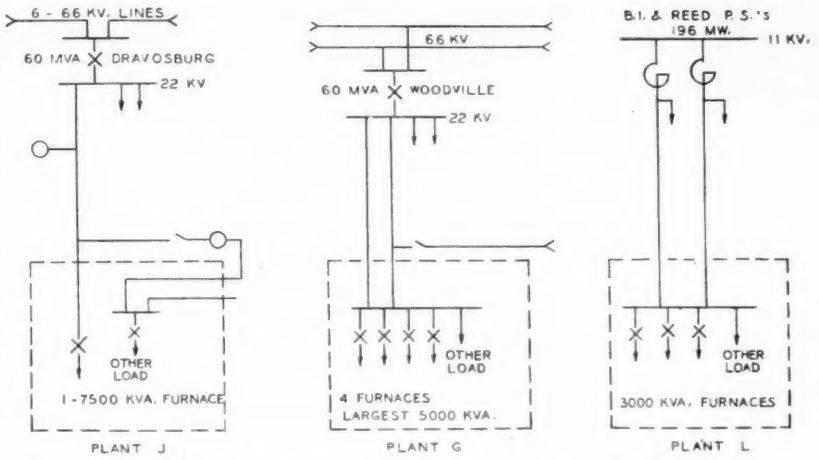

Fig. 6—11- and 22-Kv Line Connections for Electric Arc Furnaces of 3000 to 7500 Kva, 1943, 624,000 Kw Generating Capacity

As this furnace and mill load grew, 66-kv line reinforcement was necessary, and the customer's line extension was cut and rearranged and increased to 14 miles total. Later, the Phillips Power Station was installed, and the crucible line was then terminated on the 66-kv bus—a much more satisfactory arrangement.

Then the customer installed some more large rolling mill motors, and the resultant load caused sufficient voltage *regulation* so that the unbalanced voltage drop caused by the furnace fluctuations adversely affected the relays on the large rolling mill motors, causing them to trip out.

Corrective measures were therefore neccessary to render adequate voltage, and Duquesne Light installed a 10,000-kva, 66-kv series capacitor in its Kennedy Substation in this line, about 2/3 of the way (10 miles) from the Phillips Power Station to the customer. This series capacitor was the largest of its kind at the time of installation, and was described in detail at the 1948 Winter General Meeting of the A.I.E.E. See Item 10, Bibliography, and associated papers at the end of this article.

This improved voltage resulting from the installation of this 10,000-kva series capacitor is shown on Fig. 7.

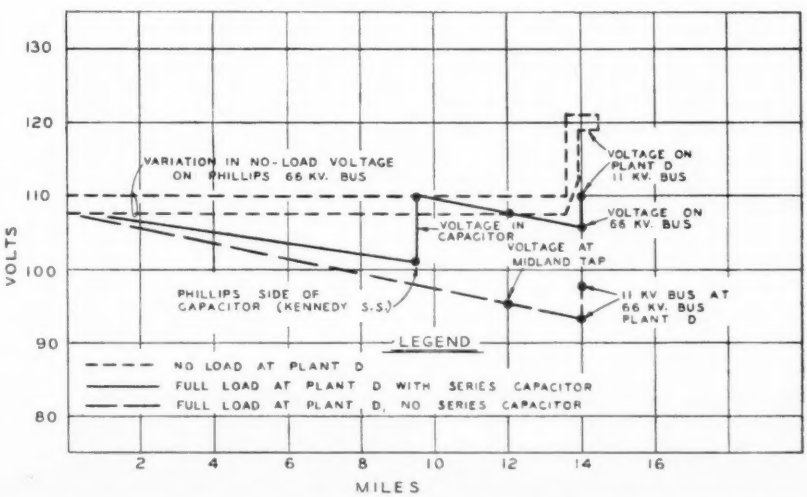

Fig. 7—Voltage Diagram Showing Regulation on 66-Kv Supply Line and on Plant D 11-Kv Bus before and after Series Capacitor Installation

Stated briefly, this series capacitor compensates for a considerable portion of the reactance in the line, and hence brings the voltage up on low power factor load.

At a point on the 66-kv line (Fig. 7), between the series capacitor and the customer, a 66-kv connection was made and a line carried across the Ohio River and connected to a 10,000-kva, 66/22-kv bank in the Midland Substation for local 22-kv load. This was not practical before the capacitor was installed because of the violent fluctuations and the wide range of voltage regulation.

We have an oscillogram of the operation of the first 10,000-kva furnace in this plant, which shows that a single-phase arc struck and restruck 10 times in an interval of 15 seconds before all three phases struck. After this initial period, all three phases struck and restruck 10 times with currents in all three phases fairly well balanced before the arcs became generally stable. For complete treatise on the tests on the first two 10,000-kv furnaces, refer to paper 6 listed in the Bibliography at the end of this article.

Plant J—Fig. 6

This proposed 7500-kva furnace was a wartime project that was not installed, although all the engineering was completed for a minimum material job. We planned to make an 0.5 mile, 22-kv, 4/0 extension from a nearby line to this plant and operate it isolated from the 22-kv network for the furnace *exclusively,* because the voltage flicker would be too great to permit tying into the 22-kv network. In case we needed this line for the 22-kv network in emergency or for repairs, the furnace would be operated at lower secondary voltage, and the exclusive line could then be connected into the 22-kv network by means of the 22-kv switch shown open. Similarly, the furnace could be carried by the 22-kv network when the exclusive 22-kv furnace line was not available, with greatly reduced secondary voltage.

Plant G—Fig. 6

This is the 1916 customer referred to earlier, and the latest furnace was a 5000-kva unit which was added about 1941.

This plant had been supplied for many years by two 4/0, 22-kv lines, each approximately 2.0 miles long, with connections to another 22-kv line and to a neighboring power company. When the 5000-kva furnace was added, the customer's total load became so large that two exclusive 22-kv lines were provided by removing all other loads from these two 22-kv lines already supplying this customer.

No serious voltage complaints have been received.

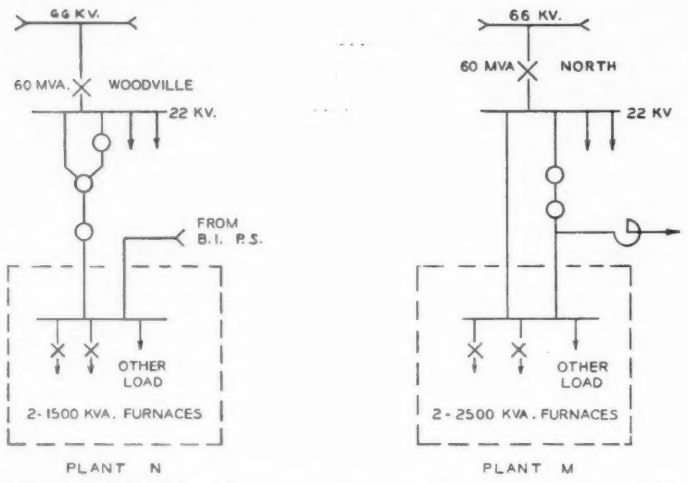

Fig. 8—22-Kv Line Connections for Electric Arc Furnaces of 1500 to 2500 Kva, 1943, 624,000 Kw Generating Capacity

Plant M—Fig. 8

This was an early furnace installation with two 2500-kva furnaces, and it has been carried on the 4/0, 9-mile, 22-kv lines from North Substation, essentially as shown, since 1925. Heavy reinforcing of the 22-kv network in that area was made about 1925 and no complaints have been received since.

Plant N—Fig. 8

This plant contained two 1500-kva furnaces for a number of years and has been supplied by two 4/0, 22-kv lines—one from B.I. Power Station, approximately 4.5 miles long, and the other from Carnegie Substation, approximately 1.0 miles long, with Carnegie being supplied by two 4/0, 22-kv lines from Woodville Substation, each approximately 2.0 miles. No complaints have been received on these furnaces.

A few years ago, a 4000-kva furnace was installed, and no change was made in the supply, as it was adequate. However, due to other load growth in this plant and in the district, another 22-kv line from Woodville to this customer, and a 30,000-kva bank in Woodville Substation, are planned for installation in 1951.

Plant K—Fig. 5

This entire plant, including the initial 3000-kva furnace, was connected to the 22-kv network initially, but certain limitations for the meltdown period were set by Duquesne Light, and the operation has been entirely satisfactory to both parties. This is accomplished by reducing the secondary voltage. Later a 5000-kva furnace was added without any line changes.

This plant is served by two 22-kv, 4/0 lines, each 5.5 miles long, one line being a standby.

World War II

During World War II, of course, Duquesne Light, like everyone else, waived standards, rules and requirements, other than voltage flicker, and some of these connections were made in a manner that would not be tolerated during peacetime. Several of the plants listed were war plants—Plants B, J and L.

Voltage Matters

Customers, as a whole, are becoming more critical of voltage flicker because more devices are being used which have a very critical point as far as voltage is concerned. Some of these are fluorescent lighting, television, timing devices, and machine tools which are being designed very closely with very little margin in the driving motor, and in some of the gearing and cutting tools.

Also, when connecting furnaces and other flicker-producing load to the system, caution is advised, even though you

can now tolerate a fairly large flicker at the point of connection and back into your system. In the future, you may want to connect another customer or a distribution substation to the lines supplying this fluctuating customer at a point where the fluctuation is too great. Of course, you could go to the customer and ask him to install corrective devices, and he would probably be totally unwilling to do so. Then the utility would have to make the additional investment to reinforce the system in that territory so that the additional load could be carried.

Voltage calculations were made on the basis of using reactance only and single-phase kva furnace swings at zero power factors, as such calculations result in a voltage drop only a few per cent less than the method using resistance and reactance and estimated single-phase furnace swings in kva at the estimated power factor. System resistance and furnace power factors are used in these calculations wherever practical.

If the customer is contemplating additional furnaces, then it is advisable to consider tooling up for the loads of the two or three furnaces at that time. We lean towards playing on the safe side in such a move, as the customer could easily put in larger furnaces in the future than he originally contemplated.

Voltage Regulation and Accumulative Kw Load for Several Furnaces in One Plant

With a number of furnaces in the same plant, particularly the larger ones of 5000 kva and up, the accumulative load of a number of such furnaces can mean a very high kwa figure in relation to any one furnace. The author knows of a steel plant with three large furnaces where the accumulative load regularly reaches 32,000 kw and lasts for an appreciable length of time. The sudden reduction of this load occurs often, creating a voltage-regulating problem in addition to the flicker problem. The reason for this problem in dropping the load is that at times it drops much faster than it builds up to the 32,000 kw, and hence the system regulating equipment of all kinds—exciters, controls and possibly governors—feels the effect of this and requires extra maintenance or additional gadgets and facilities to insure their proper operation. This is a separate and distinct problem from the flicker caused by the instantaneous swings of short duration, yet not up to the very high value of the kw load accumulative in a plant having several furnaces in operation.

Such loads bring about protection problems, i.e., fuses or relays, and careful attention must be given to this aspect of the furnace load problem.

The kw load also is greatly diversified between the two furnaces in one plant, but the two furnaces can produce simultaneously their peak kw for an appreciable length of time, and this presents a regulating problem rather than a flicker problem, although a sudden interruption of these loads does produce a large flicker.

Short Circuit Calculations

The short circuit kva values shown in Table I were determined on the basis of reactance for overhead lines and 80 per cent impedance for cables. This is the accepted method of determining short circuit values on our system because our overhead lines are practically all 4/0 conductor and have a low ratio of R to X. All items in Table I are supplied by overhead lines except item L, which is an all-underground supply.

15-Minute Kva Demand

The 15-minute kva demand produced by electric arc furnaces just about equals the nameplate rating of the furnace transformers in most instances.

However, some of the smaller furnaces have in the past been equipped with a much too small transformer, and replacement with a larger one was necessary to get the maximum output of the furnace. Also, in some cases, the furnaces themselves have been rebuilt and enlarged, and handling facilities around them have been increased—all of which contributed towards overloading the transformers, hence necessitating the replacement. The skill of the crew sometimes can place a greater burden on the transformers.

Generally speaking, it is advisable to install power transformers which may be considered oversized, rather than just enough transformer capacity, for the customer will speed up production and will attempt to get more output and make more profit, and the crew will become skilled—and the power transformer is likely to become overloaded if it is not fully adequate.

There is a distinct difference between the 15-minute demand and the heating effect of such widely fluctuating loads, and this should be considered too as an additional factor in the decision to use a so-called oversize power transformer —not the furnace transformer, for the latter is the customer's responsibility, and this furnace transformer size is very definitely recommended by furnace manufacturer or consultant.

TABLE II—KWHR PER NET TON

Furnace Rating Net Short Tons	Kwhr Per Net Short Ton Produced
6	827
7.5	608
10	604 – 795
25	569 – 580
30	601
35	569 – 585
50	477 – 650
60	556 – 600
70	500 – 510
75	500

Tonnage Produced and Transformer Sizes

The tonnage ratings, transformer sizes, and tons produced for 150 installations of from 1 to 70 tons capacity are included in Table III. These data were taken from the magazine *Iron & Steel Engineer,* Oct. 1941.

Kwhr per Net Ton

The kwhr per net ton produced varies widely, depending upon the type of scrap used, how charged, skill of the crew, type of finished product required —high grade steel or mild steel—and various other factors. The data thereon contained in Table II are, therefore, merely representative.

Furnace Circuit Breakers

The breaker on the high-tension side of the furnace transformer is used for

TABLE III—TONNAGE PRODUCED AND TRANSFORMER SIZES

Tonnage Ratings— Short Tons	Transformer Kva	Furnace Charge in Pounds	Production Per Month Short Tons
1	1,200	4,000	400
3	3,000	12,000	600
5	3,800	17,000	1,000
6	4,200	20,000	1,200
10	5,400	34,000	2,100
12	5,800	40,000	2,400
20	7,400	64,000	3,300
30	8,900	93,000	4,000
40	10,400	116,000	4,600
50	12,000	138,000	5,000
60	13,400	170,000	5,500
70	15,000	180,000	6,000

the furnace operation in shutting down and in starting, and it is operated many times a day and thousands of times per month. This duty is near the full load rating in amperes or less.

This is a very severe application from a mechanical point of view, as well as presenting a burden on the electrical contacts, compared to the usual application wherein the circuit breaker interrupts trouble on the line (that is, short circuit) and hence operates very rarely under these conditions. Also, under normal conditions the breaker is tripped occasionally under varying amounts of load up to its full load rating for maintenance, operation, inspection, switching, etc., but never, under any conditions, is operated anywhere near the number of times a furnace circuit breaker is operated.

Future Furnaces

The trend is towards larger furnaces requiring larger furnace transformers and larger power transformers, with 25,000-kva units now in service, and 37,500-kva units proposed. Also, the trend is towards higher secondary voltage on the furnace transformer—up to 350 or 380 volts and higher on the larger sizes. This will result in a greater number of kw of energy into the furnace for melting purposes, and will also result in greater swings on the power system, which can and have produced sufficient voltage flicker to cause serious and widespread complaints from other consumers.

Cyclic flicker has been caused by some of the larger furnaces with high secondary voltage, and this cyclic flicker has been reduced to the point where complaints are not received by using lower secondary voltage taps on the furnace transformer. However, it is better for all concerned to have the maximum secondary voltage that does not produce voltage complaints as the maximum available in the transformer, and this will likely require cooperation and coordination between the power customer, the steel company, and the furnace builders. The writer strongly urges such cooperation and agreement before the installation is made.

The electric furnace builders feel very strongly that electric melting furnaces are competitive with open-hearths, particularly in the larger sizes, with a suitable plant layout, and these builders have claimed for years that such furnaces are more than competitive for high-grade steels.

Conclusion

In conclusion, I will offer several pieces of advice:

1. Make an investigation and do necessary calculations to assure yourself that you can handle such furnaces at the point of connection on your system, utilizing published data.
2. Consult with other power companies supplying electric arc furnaces.
3. Recognize that more furnaces and larger furnaces are the coming thing, as well as more and larger utilization devices, which cause load fluctuation—and get set to handle them.

The writer hopes that these data will be of some real use to the members of this committee and to other Institute members, and to the industry in general in solving their problems in connecting electric arc furnaces in a satisfactory manner.

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Who Holds the Bag?

. . . Remember when Uncle Sam plays Santa Claus, it's the taxpayer who holds the bag.

No one of us understands all of the intricate problems of industry, agriculture, transportation and finance. Some things that seem clear to me are these: If I consistently spend more than I make, I'll go broke. Once broke, if I handle the matter with sufficient finesse, the government will see to it that I do not starve; if millions of other Americans get in the same situation, the government will go broke. Without exception, history shows us that when the government of a capitalistic democracy goes broke, dictatorship follows. I do not like dictatorship in any form. Therefore, I will work hard, save my money and not go broke.

That seems simple enough. But the Federal government today seems to be straining every nerve to short-circuit the process, go broke of its own accord, and bring on the dictatorship which history teaches is inevitable under such circumstances.

The most important thing to remember is that the cost of the welfare state is great and some one must pay for it. Remember that the bulk of corporation taxes are passed on to the consumer—to all of us. One thing is absolutely certain—the "planned economy" and the "welfare state" will be paid for by the great mass of the people. There is no other way.

The only real social security which this country can ever have is dependent on reasonable prices for farm products, reasonable wages for labor, and reasonable profits for capital. Such social security implies that government act as a mediator and balance wheel and not as an all-powerful master. If this is done we might look for increased production, which is essential, because if those who work must provide goods for those who are unable to work, then there must be more goods. Otherwise there will be a drop in the standard of living for everyone.—HARLAND C. STOCKWELL, *executive secretary, Civic Federation of Chicago, in an address before the AGA.*

Fatal Accidents in the Electric Light and Power Industry

By D. C. Stewart
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A paper presented before the EEI Accident Prevention Committee, Cleveland, Ohio, September 11-12, 1950.

ONE hundred and seventy-six individual reports of fatal accidents occurring in the industry in 1949 have been received. I believe these cover all the fatal accidents listed in company annual statistical reports. The splendid cooperation of utilities everywhere is appreciated.

The break-down by accident types for the years 1941 to 1949 inclusive is shown in Tables I and II. The proportion of electric shock and burn cases is up somewhat (76 per cent in 1949 vs. 68.5 per cent in 1948), but the rise is not great enough to be significant.

For the unsafe practices and conditions that caused the bulk of the fatalities in 1949, I could just as well offer the first Review and Classification for the year 1941. The story was told adequately by the first of these summaries. Succeeding years merely served to confirm the findings.

Estimates of Loss

At the rate we are going, the 1959 report will look about the same as the 1949 or the 1941 report as far as unsafe practices go.

During these nine years detailed reports have been received on 1160 accidental deaths to employees. The direct cost to the industry must run at least 10 to 20 million dollars. The economic loss to families of these men must run at least another 10 to 20 million dollars. The direct cost to the industry and to employees' families must run between 20 and 40 million dollars. No one can put into figures the human values involved.

Most Accidents Could Be Prevented

The tragedy is that the safe practices which would have prevented the bulk of the accidents in the 1949 list were developed clearly from the early summaries. The electric shock and burn accidents have accounted for 822 of the 1160 fatalities, or seven out of every 10. There are a few simple safe practices which would have prevented the bulk of the shock and burn accidents. These facts have been brought to the attention of the industry. Needed safe practices, with proof of their necessity, have been widely publicized. Yet the grim totals keep on piling up. Why?

I doubt if any one person can answer the question. However, as a committee and as individuals active in the effort to save lives and prevent suffering and loss, we have to keep on probing and trying. May I humbly offer some thoughts for consideration.

To make it as simple as possible let me take just one safe practice in line work and trace that through. One could take any other safe practice and do the same with it. But the one I have selected is both simple and of top importance. It is the wearing of rubber gloves *all the time* a workman is in the primary area. The primary area is that area in which a man can reach to a part that is or might become energized at primary voltage, regardless of whether or not the wire is covered with protective equipment.

In 1949, 28 men were killed from hand contacts while working on poles, but without slipping or cutting out. In the nine-year period 165 men were killed in this manner. Many others were killed from hand contacts due to slips or cutouts on poles or while working on the ground or in stations. Thus, in 1949, one out of five of all shock and burn cases was from hand contact while on a pole, and one out of six of all accident types was from hand contacts while on a pole. There's no question about the importance of this type of contact. It assumes a top position in the list when one thinks of prevention of fatal accidents in the industry.

Use of Protective Equipment

Not all, but most of these hand contacts could have been prevented by the simple expedient of wearing rubber gloves *all the time* in the primary area. It has been proved over and over again by individual companies that it is not only possible but practical to follow this safe practice faithfully. Why isn't it followed universally?

Since no one wants to get killed, and since few will unnecessarily place their

TABLE I—NINE YEARS OF FATAL ACCIDENTS IN THE ELECTRIC LIGHT AND POWER INDUSTRY, 1941 TO 1949, INCLUSIVE
(From EEI Accident Prevention Committee Summaries)

Year	Total	El. Shock or Burn	Falls	Motor Vehicles	Struck By	Burned	Caught In	Drowned	Misc.
1941	121	90	11	8	4	2	3	1	2
1942	121	81	19	11	6	3	0	0	1
1943	117	81	14	3	7	5	1	3	3
1944	82	62	6	5	6	1	2	0	0
1945	116	79	14	6	5	4	3	3	2
1946	105	68	19	8	5	0	2	2	1
1947	173	125	20	8	13	3	2	1	1
1948	149	102	21	13	6	2	2	0	3
1949	176	134	16	13	6	1	5	1	0
9-Year Total	1160	822	140	75	58	21	20	11	13

Review and Classification of 176 Fatal Accidents Reported During 1949 Within the Electric Light and Power Industry

Edison Electric Institute—Accident Prevention Committee

(This summary was compiled from detailed reports submitted to the Institute)

				Volts 115	App'ce Lineman	1.While belting to pole, believed to have touched live sec. wire. Fell.
				2300	Lineman	2.Changing crossarm. Touched steel pin in contact with pri. riser bus.
				2300	Utilityman	3.Touched steel crossarm brace in contact with lightning arr. pri. lead.
				2300	Foreman	4.Changing from 2300 V to 12 kv. Touched live pri. thinking it was neutral wire.
				2400	App'ce Lineman	5.Installing regulator bypass switches. Grasped live lead. Reason unknown.
				2300-4000	Lineman	6.Lifted pri. wire by hand to move it to new position. Leg touched grounded wire.
				4000	Lineman	7.Contacted 4000 volt conductor. Received shock and fell 30 feet.
				2400-4160	Troubleman	8.Jumpering st. lt. potheads. Hand touched st. lt. wire crossed with pri.
				4600	Lineman	9.Installing wiring for temporary transf. Received shock in unknown manner.
				4800	Lineman	10.Installing pri. wires. Shoving line hose along wire barehanded. Shocked.
				6900	Lineman	11.Climbing pole. Hand contacted 6900 V bare delta bus. Fell 18 feet.
				6900	Lineman	12.Extending sec. wire. It caught on bush. Shaking it loose it touched pri.
			HAND	6900	Lineman	13.Raising transf. Crossarm broke allowing phase wire to strike rt. thumb.
				6900	App'ce Lineman	14.Boring holes in pole. Attempted to remove line hose barehanded. Shocked.
			28	7200	Lineman	15.Changing from 2.4 to 7.2 kv. Changing transf. believed dead. It was alive.
			CASES	7200	Lineman	16.Returned to job after interruption. Apparently forgot condition, jumper alive.
				7200	Sec.Lineman	17.Repairing line after storm. Made contact with live jumper and neutral.
				7200	Lineman	18.Splicing wire with hot stick. Grasped energized ferrule of hot stick.
				7200	Lineman	19.Pri. wire dropped from transf. bushing, touched case. Contacted transf. case.
				7200	Lineman	20.Changing transf. cutouts. Contacted 7200 V wire while working barehanded.
				7200-12,000	Lineman	21.Disconnected riser from pri. to transf. Handling riser it touched pri.
				12,000	Lineman	22.Pulling in dead wire with 2 wires hot. It caught. Pulled into transf. riser.
				13,200	Foreman	23.Punching holes in steel arm. Raised punch handle into live wire 3 feet above.
				13,800	Serviceman	24.Replacing hot line clamps with 8 ft. shot-gun stick. Contacted fuse switch.
				33,000	Lineman	25.Changing insulators on vertical corner. Contacted block attached to span wire.
				60,000	Lineman	26.Working 1 circuit dead on 2 circuit line. Climbed tower, contacted hot line.
				66,000	Trans'm Man	27.Crossing top of switch structure at river crossing, contacted air break switch.
				St.Lighting	Lineman	28.Inspecting st. lt. on side of pole, from truck catwalk. Contacted live st. lt. wire.
				115 - 230	Lineman	29.Cut loose sec. wire crossed with other sec. Pull of wire swung him ag. bare sec.
				115 - 230	Lineman	30.Converting from 2.4 kv to 4 kv. Fell 20 ft. Possible secondary contact.
				2300	Lineman	31.Installing 3rd wire on pri. Made arm contact tying in phase wire.
				2300	Serviceman	32.Climbed pole on trouble call, contacted live wire with right arm.
ELECTRIC				2300	Lineman	33.Replacing 1/0 with 4/0 wire. While forming jumper elbow contacted pri.
				2300	Lineman	34.Changing jumpers. One man shocked. Rescuer became excited, made contact.
				2580	Lineman	35.Converting from delta to wye system. Removing cutout and arrester. Shocked.
SHOCK	LINE		ARM	2200-4000	Lineman	36.Replacing section. Attempting to take kink out of wire before splicing. Shocked.
				4000	Lineman	37.Fell across pri. phase wire and neutral. Rolled, made contact beyond 4-1/2 ft. hose.
	WORK			4160	App'ce Lineman	38.Splicing wire. Connectors slipped. Connector handle spun, struck him on arm.
			21	4160	Lineman	39.Changing from pole top to cross arm construction. Contacted connector twister.
			CASES	4160	Lineman	40.Removing bracket of pothead of underground "dead" cable. It was alive.
OR	ON			4160	Lineman	41.Changing from 4160 to 12 kv. Completed dead end. Contacted wire or come along.
				4600	Lineman	42.Believed to have inadvertently dislodged rubber hood from insulator. Shocked.
	POLES			4800	Lineman	43.Handling jumper from pri. It swung into fuse cutout. Contacted cutout.
				6900-12,000	Lineman	44.Removing rubber goods. Removing blanket, contacted live hot line clamp.
BURN				7200	Lineman	45.Changing bell insulators. Placing grip, elbow contacted dead end shoe.
	85			22,000	Lineman	46.Pulling wire under 22 kv. It contacted grd. wire alive from broken 22 kv ins's.
	CASES			46,000	App'ce Lineman	47.Changing 44 kv insulator with hot sticks. Shifting position, touched phase wire.
				St.Lt.Circuit	Foreman	48.Changing arms. While installing arm brace, st. lt. circuit became alive.
134				Not Stated	Lineman	49.Removing tie wire. Contacted exposed pri. between hose and insulator.
CASES				120	Lineman	50.Removed hot line clamp to locate trouble. Securing clamp, fell against sec's.
				120	Lineman	51.Extending sec's. Reaching to remove come alongs contacted bare sec. splices.
				190	App'ce Lineman	52.Received shock from sec's, fell from pole, fracturing skull and ribs.
				2400	Lineman	53.Preparing to remove transf. Standing on transf. contacted pri. feeder wire.
76.1%			BODY	2300	App'ce Lineman	54.Removing transf. riser from pri. Contacted riser. Fell 30 ft. to ground.
				2300-4000	Lineman	55.Removed gloves and sleeves. Contacted jumper stub protuding from line hose.
			12	2400-4150	Troubleman	56.Replacing broken pins on pole, contacted phase wire. Fell to ground.
			CASES	4160	Foreman	57.Preparing to transfer wires. While climbing contacted phase wire. Fell.
				4600	Subforeman	58.Converting from 4600 to 8000 V. Skinning insulation from wire, contacted chest.
				6900-12,000	Lineman	59.Climbed to remove hot line clamps. Climbed too high, contacted phase wire.
				7200	Lineman	60.Removing transf. Reached to cut wire brace from pin block. Contacted line wi.
				6900-12,000	Meter Installer	64.While connecting service drop, contacted phase wire of 12 kv pri.
			7	6900	Lineman	65.Moving grd. wire near sec. rack. Climbed too high, contacted pri. wire.
			CASES	7200	App'ce Lineman	66.Stringing in new wire for neutral. Climbed too high, contacted pri. wire
				7200	Lineman	67.Removing burned down st. lt. circuit. Climbed to top of pole, contacted pri.

			2300-4000	Lineman	55.Removed gloves and sleeves. Contacted jumper stub protuding from line hose.
		12	2400-4150	Troubleman	56.Replacing broken pins on pole, contacted phase wire. Fell to ground.
		CASES	4160	Foreman	57.Preparing to transfer wires. While climbing contacted phase wire. Fell.
			4600	Subforeman	58.Converting from 4600 to 8000 V. Skinning insulation from wire, contacted chest.
			6900-12,000	Lineman	59.Climbed to remove hot line clamps. Climbed too high, contacted phase wire.
		HEAD	7200	Lineman	60.Removing transf. Reached to get winch rope from gin block. Contacted line ...
			6900-12,000	Meter Installer	64.While connecting service drop, contacted phase wire of 12 kv pri.
		7	6900	Lineman	65.Moving grd. wire near sec. rack. Climbed too high, contacted pri. wire.
		CASES	7200	App'ce Lineman	66.Stringing in new wire for neutral. Climbed too high, contacted pri. wire
			7600-13,200	App'ce Lineman	67.Repairing burned-down st. lt. circuit. Climbed to top of pole, contacted pri.
			23,000	Cable Splicer	68.Climbed pole to phase out cable. Contacted disconnected tap to pothead.
		LEG OR	2400-4160	Lineman	69.Shaking dead pri. wire to free it. Crossarm twisted, displacing hose. Touched pri.
		FOOT	2750-4800	Lineman	70.Standing on pri. arm replacing 24 kv wire above. Foot touched block on pri.
		3 CASES	7200	Lineman	71.Preparing to tie in 6.9 kv conductor, when he received shock and burns.
		CONTACT	120	App'ce Lineman	72.Replacing service wire. Injured shouted and slipped down pole. No burns.
		NOT	1500-2300	Troubleman	73.Climbing pole to refuse transf. Contacted sec's. and grounded transf. hanger.
		STATED	4800	Lineman	74.Dead-ending pri. wires on insulator. No burns found. Possible heart attack.
			7200	Meterman	75.Installing metering. Contacted pri. on transf. rack preparing to cut in transf's.
		6	7620-13,000	App'ce Lineman	76.Measuring pole height with metallic-base tape. It contacted a pri. wire.
		CASES	7620-13,000	App'ce Lineman	77.Received shock while pulling in new 13 kv three phase circuit.
	SLIPS		7200	Lineman	78.Inspecting transf. Glove caught, he lost balance and contacted jumper.
			7200	Serviceman	79.Changing lightning arr. Disconnected hot line clamp, lost balance, touched pri.
	GAFF CUTOUTS		115	App'ce Lineman	80.Pulling in service wire. Cut out and contacted energized sec. wire.
			1200-2300	Lineman	81.Swung around pole to descend. Cut out, contacted pri. and grounded guy.
			2400-4160	Lineman	82.Installing st. lt. circuit. Cut out and hand contacted live pri. wire.
			2400-4160	Lineman	83.Preparing to tape tap on pri. Hook struck knot, arm touched exposed pri.
			4600	Lineman	84.Changing insulators. Cut out and neck contacted 4600 V pri. wire.
			Induced	Lineman	85.Changing units on transmission line. Cut out, fell into line. Induced charge.
CABLE WORK UNDERGROUND			6600-11,000	Cable Splicer	86.While in manhole cable which had not been worked on failed. Fatal burns.
			Not Stated	Cable Splicer	87.Going into manhole. Touched hot case of oil cutout, broken down by ltng.
	FALLEN WIRE		2300	Troubleman	88.Pulled cutout thinking to deenergize fallen wire. Picked up wire. Alive.
	PULLING WIRE		2400-4800	Patrolman	89.Pulled "dead" wire wrapped around same insulator groove with hot wire.
LINE	ENERGIZED TRUCK		4600	Lineman	90.Guiding pole hole digger. It struck pri. while he was touching truck.
	ENERGIZED TRUCK		6900	Foreman	91.Guiding truck under line to support broken pole. Derrick struck pri.
WORK	ENERGIZED TRUCK		6900	App'ce Lineman	92.Putting up truck jacks. Phase wire came down on truck winch line.
	ENERGIZED TRUCK		7200-12,470	Lineman	93.Guiding pole. It touched line, energizing winch line. He touched truck.
ON	GROUND WIRE		7200	App'ce Lineman	94.Cut ground wire from a transf. This wire was the sole neutral connection.
	GROUND WIRE		7200-12,500	Lineman	95.Pulled ground wire from ground rod. Transf. not connected to neutral grid.
GROUND	GROUND WIRE		7200-12,000	Groundman	96.Preparing to ground 12 kv circuit. Lineman attached ground wire to live line.
	WIRE FLIPPED UP		6900-11,000	Groundman	97.Stringing bare copper neutral. It caught in brush, flipped into pri.
	WIRE FLIPPED UP		7200-12,000	Foreman	98.Pulling sec. wire. Wire caught. On pulling free it flipped into pri.
15	WIRE FLIPPED UP		13280-23,000	Groundman	99.Tending reel. Wire being pulled in over arms whipped into 23 kv wire.
CASES	WIRE FLIPPED UP		23,000	Groundman	100.Pulling fallen tel. wire. Jerked it free from trees. Flipped into 23 kv.
	BLASTING WIRE		39,000-60,000	Foreman	101.Blasting pole holes. Lead wires from exploder blown up into 60 kv.
	METALLIC TAPE		6900-12,000	Helper	102.Measuring for switch handle. Wind blew metallic tape into pri.
			2300	Maint. Helper	103.Disconnects on aux. bus overlooked and left closed. Contacted disc. blade.
	DISCONNECTING		4000	Maint. Mechanic	104.Testing 4 kv breaker. Failed to close breaker. Helper opened bypass sw's. Arc.
			2400-4160	Lineman-Splicer	105.Climbed in deenergized bay. Foot slipped, reached, touched switch.
	SWITCHES		12,000	El. Utility	106.Opened cell door adjacent to dead cell. Apparently slipped, made contact.
AT			7200-12,000	Operator	107.Temporary connections not added to sta. diagram. Opened switches. Arc.
STATIONS			23,000	Maint. Man	108.Descending from structure. Disc. sw. insulator flashed over. Burned.
ON OR	9		34,500	El. Mechanic	109.Installing gear box for disc. mechanism. Climbed too high, contacted sw.
AROUND	CASES		44,000	Electrician	110.Restringing bus in sta. Climbed bus structure, contacted live sw.
EQUIPMENT			66,000	Electrician	111.Attempted to walk through open bypass 66 kv sw. Made contact.
BUS	CIRCUIT		60,000	Local Rep've	112.Confused energized breaker with dead adjacent breaker. Touched bushing.
STRUCTURES	BREAKERS		6900-12,000	Dist. Eng'r.	113.Inspecting name plate of breaker. Foot slipped from battery box. Contacted 12 kv.
ETC			44,000	El. Helper	114.Testing switches. Went to work on live switch without getting clearance.
	4 CASES		110,000	Eng'r. Aide	115.Rested level survey rod on breaker pad. Rod touched 110 kv breaker bushing.
32			2400-4160	Lineman	116.Changing sec. to correct rotation. Climbed on transf. Contacted phase wire.
CASES	LEADS, RISERS		6900-11,000	Lineman	117.Disconnecting transf. Climbed on transf's, slipped, touched lead to disc. sw.
	AND CABLES		25,000	App'ce Lineman	118.Working on substa. structure. Forgot which circuit was hot. Contacted 25 kv.
			19,000	Mechanic	119.Climbed on breaker to pass nut to other man. Contacted bushing lead.
	6 CASES		22,000	Tr. Maint'man	120.Removing surge crest ammeters. Contacted 22 kv jumper while descending.
			66,000	App'ce Elec'n	121.Cleaning and meggering pot. transf. Climbed on pot. transf., contacted lead.
	LIGHTNING		33,000	Groundman	122.Painting structure. For unknown reason climbed, walked 8 ft. to lightning arr.
	ARRESTER		33,000	Lineman	123.Climbing column of structure. Contacted lightning arr. adjacent to column.
			26,000	Groundman	124.Short wave aerial on truck contacted overhead line. He touched truck.
	OVERHEAD		26,000	Groundman	125.Same as 124. Believed to have grasped truck handrail to tell driver of 1st injury.
	LINE		33,000	Foreman	126.Assisting driver to back truck. Holding winch line when boom contacted line.
			33,000	Mechanic	127.See case 126. Believed to have tried to open truck door, perhaps to get 1st aid kit.
	6 CASES		34,500	Caretaker	128.Attempting to trim trees from station roof. Trimmer contacted line.
			100,000	Laborer	129.Assisting driver to back truck. Touching truck when boom contacted line.
	120 V PLUG		120	Maint'man	130.On inserting plug in receptacle, other plug held in same hand became alive.
	UNDERGR'D CABLE		2300	Laborer	131.Breaking concrete foundations with air hammer. Drill hit live cable.
	TRANSFORMER		13,000	Electrician	132.Painting transf's. Climbed on top of transf. platform, made contact.
	POT.TRANSFORMER		33,000	El. Mechanic	133.Cleaning current transf. bushings. Lost footing, fell ag. live pot. tr. bushing.
	CPLG.CAPACITOR		40.000	Lab. Tester	134.Preparing to test current transf. Reached near live coupling capacitor. Arc.

Review and Classification of 176 Fatal Accidents Reported During 1949 Within the Electric Light and Power Industry

Edison Electric Institute—Accident Prevention Committee

(Continued)

FALLS 16 CASES 9.1%	LINE WORK 15 CASES	FALLS FROM POLES OR TOWERS 10 CASES	App'ce Lineman Foreman App'ce Lineman App'ce Lineman Lineman Lineman Lineman Lineman Lineman App'ce Lineman	135.Knocking ice from wires after storm. Lost hand hold, fell to ground. 136.Changing position on dead end board. Removed strap, fell from board 25 ft. 137.Safety strap around 19 ft. loop of 3/4" rope. Fell, impact broke strap. 138.Connecting jumpers on tower. Changing position, fell 90 ft. to grd. 139.Placing safety strap around pole 46 ft. above ground, fell. 140.Descending pole. Apparently "blacked out" and fell to ground. 141.Changing position. Failed to fasten snap to D-ring. Fell to pavement. 142.Descending pole. Spurs cut out, and he fell to the ground. 143.Descending pole. Fell from a point about 19 ft. from the ground. 144.Hand line tied to D-ring and to wire across road. Climbing. Truck struck wire.
		FALLS WITH POLES 5 CASES	App'ce Lineman Lineman Lineman Lineman App'ce Lineman	145.Cut service wires at old pole. On cutting 3rd wire, pole fell. 146.Stripping wires from pole before taking it down. The pole fell. 147.Climbed pole damaged by city bus. Wires were cut and pole fell. 148.Climbing pole reported bad to tie on temporary rope guys. Pole fell. 149.Climbed pole to remove span guy. Cut guy wire and pole fell.
	BUILDING	FROM DOORWAY	Laborer	150.Pushing castings from doorway to drop them to ground 20 ft. Fell with casting.
MOTOR VEHICLES 13 CASES 7.4%	VEHICLE COLLISION ON HIGHWAY 8 CASES	HEAD-ON COLLISION HEAD-ON COLLISION HEAD-ON COLLISION HEAD-ON COLLISION REAR-END COLLISION REAR-END COLLISION REAR-END COLLISION INTERSECTION COLLISION	Foreman Sta. Operator Exec. Ass't. Surveyor App'ce Lineman Clerk Driver Serviceman El. Eng'r.	151.Driver of approaching car lost control, swerved into company car. 152.Driver of company car driving too fast for conditions. Slid on wet rd. Collision. 153.Lost control of car on slick mud at underpass and curve. Collision. 154.Approaching truck swerved over into path of company car. Collision. 155.Runaway cattle truck and trailer rammed rear of company line truck. 156.Same as 155. Double fatality. 157.Attempting to locate house no. on service call. Car struck in rear by truck. 158.Company car was struck broadside by other car at street intersection.
	VEHICLE LEFT HIGHWAY 4 CASES	SKID SKID LEFT ROAD AT TURN DEFECTIVE EQUIPMENT	Field Clerk Foreman Transitman Groundman	159.Riding as passenger in company car. Car skidded on wet road, overturned. 160.Driving down grade on newly paved wet road. Car skidded, turned over. 161.Driving down highway, failed to negotiate turn, car overturned. 162.Front drive shaft came loose. Car went over 14 ft. bank. Hand severed.
	RR CROSSING	STRUCK BY TRAIN	Driver	163.Struck by fast passenger train at crossing. Clear view 1 mi. both ways.
STRUCK BY OBJECTS 6 CASES 3.4%	LINE WORK 3 CASES	TRANSFORMER FELL UNLOADING POLES CROSSARMS FELL	Groundman Groundman Lineman	164.Setting transformer. Rope broke. Transformer fell from pole, struck man. 165.When top steel band was cut poles kicked out. Side stake broke, hit man. 166.Removing crossarm. Wind blew it from hands. It fell, bounced, struck man.
	STEAM PLANT	VALVE FLOAT HOUSING BOILER BAFFLE	Junior Eng'r. Hoist Eng'r.	167.Adjusting float control on heater drainage control valve. Housing fractured. 168.Workman dropped baffle. It fell to operating floor, striking employee.
	STATION	TRANSFORMER FELL	Eq't. Operator	169.Setting Transformer. Outrigger kicked out, truck tipped. Transf. fell.
CAUGHT IN 5 CASES 2.8%	POWER PLANT	COAL ELEVATOR MECHANISM CONVEYOR HEAD PULLEYS COAL BUNKER COAL BUNKER CRANE OVERTURNED	Welder Conveyor man Laborer Laborer Eq't. Operator	170.Repairing scraper on lower drum, coal elevator. Brake failed. Caught in mechanism. 171.Entered section containing head pulleys in motion. Caught bet. pulley and belt. 172.Clearing stoppage in coal bunker. Buried by coal slide. 173.Same as 172, double fatality. 174.Cleaning debris from forebay with crane. Swung bucket, crane overturned.
BURNED	PLANT	IGNITED COAL DUST	Iron Worker	175.Dismantling coal chute. Coal dust spilled out. Ignited by acetylene torch.
DROWNED	STATION	BOAT SANK	Foreman	176.Pumping sand for substation fill. Boat sank. Cause unknown.

Compiled for EEI Accident Prevention Committee
by D. C. Stewart, December 1950

lives in serious jeopardy with full knowledge that they are doing so, it must be because the individual worker and foreman underestimate the hazard or overestimate their ability to deal with the hazard without rubber gloves.

Every single year of the nine-year period is filled with examples of underestimation of the hazard or overestimation of ability to cope with it without the protection of gloves. The pattern is stable from year to year. It will remain fixed unless more is done than has been done.

Causes of Accidents

It is impossible to overemphasize one point. These men are not being killed by deliberately attempting to work bare-handed on conductors that are known to be energized. They are killed when they cut out or slip in the primary area and reach for support only to find death against a live wire; they are killed when they touch wires supposedly dead but energized from crosses with live wires, sneak back feeds or other means; they are killed when pulling or handling wires on the ground that flip up or otherwise contact live wires in the span or on structures; they are killed when they try to install or remove line hose or hoods bare-handed, and so the story goes. There's hardly a case in any one of the nine years that isn't duplicated several times elsewhere in the list. History repeats itself over and over again with tragic regularity. All that was needed for prevention was tied up in the story of the first cases. The others died because someone didn't read or heed, or do anything about it.

Why Accidents Recur

Why do we get nowhere, with such overwhelming proof of the importance of the hazard and with such a simple safe practice at hand to control it? Before getting too critical, let's look at something that may be pretty "close to home."

Item 14 of the detailed report reads this way: "What has been done to prevent the recurrence of this type of accident?" This space on many of the reports is as bare as Mother Hubbard's cupboard. Many others carry such resounding phrases as "Better supervision" or "Closer observance of rules." Some show evidence of serious thought and constructive action, but I would say such reports are in the minority.

TABLE II—DISTRIBUTION OF ACCIDENT TYPES
(By Percentages of Total Accidents)

	9-Year Average	9-Year Range	
		Minimum	Maximum
Electric Shock or Burn	70.9	64.7	76.0
Falls	12.1	7.3	18.1
Motor Vehicles	6.5	2.6	9.1
Struck By	5.0	3.3	7.5
Burned	1.8	0	4.3
Caught In	1.7	0	2.8
Drowned	0.9	0	2.6
Misc.	1.1	0	2.4

I have the feeling that many of the companies are not coming to grips with the problem of prevention, even though the needed facts are before us. I suppose a Safety Man ought to be a bit ashamed of putting such a feeling into verse. I'll apologize first, then I won't have to do it later. I've entitled it "HE DIDN'T FOLLOW THE RULES."

"HE DIDN'T FOLLOW THE RULES"

Here lies the body of Lineman Dunn
Top grade man he was, A-1
Hot wire got him, he passed away
All on a sultry summer's day.

Front office flurry, got to pause
Long enough to find the "cause"
Committee meets to investigate
Excellent move, though a trifle late.

Members scratch their respective heads
Seem to be kind of short of leads
'Til the brightest shouts "Let's take a look
And see what it says in the little book."

Good idea, ah, that's the place
Stands out plain as the nose on your face
Rule five dash two, NO, the one above
Says he oughta have worn his gloves.

Committeemen nod in grave assent
See at once their time's well spent
Cause is plain to all but fools
"This man did not observe the rules."

Committee's conclusion, this case is sad
But he didn't observe the rules—TOO BAD!
Front office flurry soon is past
Chance to get out some work at last.

And that's the story, sermon and text
While Fate stands by and calls out "NEXT!"

Let's set up a mythical report, that is, one that hasn't been received yet. Item 14 asks "What has been done to prevent the recurrence of this type of accident?" The cupboard isn't bare this time. We read:

"We have thoroughly investigated this accident. We know that failure to wear rubber gloves was the immediate cause. We have checked carefully the EEI record on hand contacts and their causes. We have concluded that it is essential that our men wear rubber gloves, not just when handling parts directly, but *all the time* they are within reach of conductors that are or might become energized at primary voltages. We have checked practices in the field and find we are short of that ideal.

Intensive Safety Program

"These facts have been discussed with the headmen of our company. As a result of the discussion, we are immediately starting a planned, intensive effort to persuade our people that this safe practice is sensible, necessary and a "must" in our operations if other employees are to be saved from the same type of accident that killed this man.

"Progress reports will be required. We will not be content until we arrive at the point where a lineman who doesn't wear rubber gloves *all the time* in the primary area, or a supervisor who does not require his men to do so, are no longer first-class men to their fellow employees, their supervisors or their company."

The Price of Safety

You would say that this company is well on the way to eliminating the possibility of deaths from hand contacts. They are willing to pay the price of safety. For safety has a price. The old song, "The Best Things in Life Are Free," may apply to the air we breathe or the sunshine we enjoy, but it doesn't apply to safety, nor indeed to most of the other worthwhile things of life. The price of safety is named in the answer to question 14 of the mythical report; that is to say, the will to save injuries and lives, the active desire to roll up one's sleeves, wring the last bit of good from the torn fabric of experience, all followed by a lot of hard, often discouraging work by a lot of people.

Our principal function as a committee is to gather the facts, try to interpret them intelligently, formulate safe practices, forge the best possible tools for accident prevention, so to speak, and lay those tools before the industry. Further than that, I think we have an obligation not merely to say, "Here are some good

(*Continued on page* 63)

Accountants' Conference

(*Continued from page* 38)

The Customer Relations luncheon meeting will first listen to an interim report by B. J. McMillen, The Cincinnati Gas & Electric Company, on two related projects on training of customer accounting employees in dealing with customers, one called "Training by Manuals," the other, "Training by Films." The rest of the meeting will be devoted to an open forum on four topics, each of which is a long-term study project. These are: "Coordination Between Customer Accounting and Other Departments in Handling Customer Complaints," H. R. Flanegan, Philadelphia Electric Company, leader; "Value of District Offices to Customers and Companies," H. C. Smith, The Peoples Gas Light and Coke Company, leader; "Hi, Neighbor!"—a welcome to new customers, W. E. Sturm, West Penn Power Company, leader; and "The Telephone Institute," described by C. J. Berner, Wisconsin Electric Power Company.

Customer Activities

On Wednesday morning the entire Customer Activities group will again meet as one with the same presiding officers as for the previous morning sessions. Mr. J. D. Elliott, The Detroit Edison Company, will give a short talk on "The Democratic Technique of Supervision." Most of the session will be given over to an organized debate, followed by or interspersed with a general discussion on "Monthly Billing and Meter Reading vs. Other Forms of Billing and Reading." Three speakers will support the positive, three the negative, one speaker on each side presenting the point of view of the man directly interested, respectively, in customer accounting, customer relations, and customer collections. Those defending monthly billing and reading will be J. H. W. Roper, Washington Gas Light Company, Customer Accounting; Paul Fry, Manufacturers Light and Heat Company, Customer Collections; and J. C. Faris, Union Electric Company of Missouri, Customer Relations. Those supporting other than the conventional monthly billing and meter reading will be J. D. Green, Philadelphia Electric Company, Customer Accounting; S. C. Grant, Philadelphia Electric Company, Customer Collections; and G. A. Kunz, Consolidated Edison Company of New York, Inc., Customer Relations.

Alabama Power Co. Pledges Aid in Campaign to Promote Birmingham Industrialization

THOMAS W. MARTIN, chairman of the Alabama Power Company, has pledged on behalf of the company one-fifth of a $500,000 fund to be raised over the next five or 10 years to promote the greater industrialization of the Birmingham area. This fund will be used to advertise the city both locally and nationally in order to diversify the capital city's industry and business.

In a letter to the Birmingham Chamber of Commerce, Mr. Martin outlined a plan to "mobilize civic interest," which was presented to the chamber at its annual meeting last Dec. 7. He pointed out that such a program is now receiving the consideration of the Greater Birmingham Development Committee and expressed the belief that, with determined effort, Birmingham could become one of the greatest manufacturing and distribution centers in the south.

"Everything proposed for Birmingham can be accomplished," Mr. Martin continued, "but we must realize that these efforts will be limited in scope and success by the efforts we make and by the amount of money subscribed to finance a far-reaching, well thought-out program.

"The national situation must for the present defer the actual beginning of such a program. Indeed, our first duty as citizens is to consider that situation and act as may be best for the nation as well as the district.

"A city," Mr. Martin said, "cannot become great or remain great whose leaders do not hold out for its citizens the hope for a better future. This calls for a leadership that blazes our paths, that shows what needs to be done and what can be done. It calls for a definite campaign of education and promotion; for something out of the ordinary, some startling move to awaken the citizenship to the urgent need of a city-wide plan looking far into the future—a better future."

"Power-Full Indiana" Booklet Gives Facts on Eight Hoosier Electric Companies

TO tell Hoosiers about "'Power-Full' Indiana," a new booklet on "The Facts About the Indiana Electric Companies' Expansion Program—1941 Through 1953" has just been published by the eight privately owned electric companies of the state.

Thirty-six questions and their answers are grouped under seven headings covering Indiana's power system network today, generation, transmission, distribution, interconnection, the Hoosier electric companies' contribution to state welfare and prosperity and the effect of expansion on efficiency and operating costs. In addition, the 20-page pamphlet includes a three-color map of Indiana's power network and is illustrated with photographs.

The new fact book is the result of several months of intensive work on the part of a committee composed of top-level representatives from Indiana & Michigan Electric Co., Indianapolis Power & Light Co., Madison Light & Power Co., Mooresville Public Service Co., Northern Indiana Public Service Co., Public Service Co. of Indiana, Inc., Rockport Water Works Co., Inc., and Southern Indiana Gas & Electric Co. Cooperating in its publication was the Bozell & Jacobs office in Indianapolis.

Viewed as one phase of the public information program which is being carried out by the committee, the booklet is being distributed widely, with some 90,000 copies going to Indiana teachers, ministers, Farm Bureau heads, Directors of Rural Electric Membership Corporations, labor leaders, editors and other community figures.

Among the questions which the new pamphlet answers are: Why was Indiana's $500-million expansion program undertaken? Why is long-range planning necessary? How much electricity do Hoosiers require? Who generates electricity in Indiana? How much Indiana coal is used to generate electricity in the state? Just what are transmission lines? Where are Indiana's distribution lines located? Why are Indiana's electric companies' systems interconnected? How many people are employed by the electric companies of Indiana? Does electricity increase farm and industrial income? Are the rates and services of the Indiana electric companies subject to state regulation of any kind?

EEI Medal Awards Pay Tribute to Resuscitation Training and Alertness of Electric Company Employees

Second Lineman to Earn Two EEI Awards
Honored by Originator of Pole Top Method

THE honoring of Lineman George Ammon with an EEI award was an event of unusual significance to members of the Duquesne Light Company. For Mr. Ammon it marked the presentation of his second award for the successful pole top resuscitation of an injured co-worker. For General Superintendent of Distribution E. W. Oesterreich, the originator of pole top resuscitation, it was further proof of the value of his research begun nearly twenty years ago.

Developed by the electric industry to cope with the resuscitation problems peculiar to overhead line work, pole top resuscitation is the direct result of a study made by Mr. Oesterreich in 1931. At that time Schafer prone pressure, introduced by Sir Edward Schafer in 1903, was the standard resuscitation technique used throughout the industry. Through the years the Schafer method has proven to be of great value in the treatment of gas asphyxiation, drowning, and many cases of electric shock, but a statistical survey conducted by the Duquesne Light Company in 1931 revealed that prone pressure was usually ineffective in reviving linemen who received shock on elevated structures.

Linemen had to be lowered to the ground before prone pressure could be applied, and Duquesne's field experience showed that by the time a victim was cleared from energized equipment, a rope rigged to lower him, and sufficient men gathered to assist this operation, five to ten minutes were consumed. Clinical research determined that resuscitation was generally not successful where such a period of time elapsed between shock and the application of artificial respiration.

Thus Mr. Oesterreich set out to discover a resuscitation technique which would minimize this dangerous lapse of time, and in 1931 he originated the pole top method. This technique embodies the main principles of Schafer prone pressure but differs in that it can be applied to injured linemen on elevated structures. It was quickly adopted by the Duquesne Light Company but was withheld from general use until actual experience substantiated its worth. However, since its presentation to the industry by Mr. Oesterreich in 1939, pole top resuscitation has been widely accepted as standard practice by other operating companies. At the present time, approximately half of the resuscitations recognized by the EEI Medal result from application of the pole top method.

Lineman George Ammon demonstrated the principles of pole top resuscitation on July 12, 1947, when he saved the life of Edward Quig and thereby won a second EEI award. While working on a 45-foot pole, Lineman Quig received shock and slumped into his strap. Making sure that Quig was free of electrical contact, Ammon moved his own safety belt up the pole until Quig was in a position astride the belt and facing the pole. Working from behind the victim, Ammon then applied an upward pressure with his hands and arms on Quig's abdominal region. This pressure was released and periodically reapplied every three or four seconds, and after about nine minutes of this treatment Quig was able to breathe normally. He was then lowered to the ground with the help of other linemen. In similar cases the victim is often lowered by means of a hand line.

Since the inception of the EEI Medal in 1933, only Mr. Ammon and one

GEORGE AMMON (center) receives the EEI Medal from W. G. Gens (right), vice president of the Duquesne Light Company, assisted by General Superintendent of Distribution E. W. Oesterreich, the originator of pole top resuscitation.

other electric company employee, Mr. F. I. Whaley of the Texas Power and Light Co., have received the award twice. Lineman Ammon was given his first medal in 1944 for resuscitating coworker J. W. Barley. Additional information on his latest award appears further on in this article.

The EEI Medal is awarded to electric company employees who by means of the Schafer prone pressure or pole top method revive victims of electric shock, and in 1950 twenty medals were authorized for presentation. (See the January, 1951, issue of the BULLETIN.)

In accordance with the policy of presenting medal case histories as they become available, summaries of nine awards appear on following pages. These reports commend the skill displayed by company employees in the application of artificial respiration and demonstrate the effectiveness of the training given these men. The cases also point out the necessity of frequent drills in resuscitation techniques.

Remarks pertinent to this were made last year by Mr. Frederick G. Harriman, safety director of the New England Power Service Co., at the presentation of an EEI Medal to a company lineman. Mr. Harriman said, "If anyone questions the value of regular practice (in artificial respiration), we have only to remember that every once in a while we get our reward—another life saved—and I think we all agree that one life saved justifies thousands of hours spent in practice."

Brief statements concerning nine EEI award cases follow.

THOMAS M. BRABHAM

Southwestern Public Service Company

On July 21, 1948, a line crew was replacing a section of wire between two junction poles on opposite sides of a highway four miles east of Roswell, New Mexico. Linemen Thomas Brabham and Edgar Huggins were on one pole, and Lineman Claude Bell was working above Lineman Clarence Seifert on the other pole. As Seifert reached overhead to attach a jumper, he contacted a 7200-v line with his left arm and collapsed. His neck rested against a phase wire and his hip against the neutral.

The sound of an arc alerted Truck Driver Thomas Carter, and he notified other crew members of the accident. Bell, who was not in a position to aid the unconscious Seifert, yelled to Brabham and Huggins on the other pole to cut the jumpers feeding the circuit. The circuit was killed, and Brabham lowered himself to the ground, crossed the highway, and climbed up under the victim.

Brabham administered pole top resuscitation for five minutes until Seifert was able to breathe normally. In the meantime, Huggins attached a portable telephone to a telephone wire on the pole and called Line Superintendent O. J. Naron, who reached the scene of the accident within a few minutes. Bell, Huggins, and Brabham then rigged a line and, with the help of Carter, Naron, and Groundman B. D. Shaver, lowered the injured lineman to the ground.

An ambulance was summoned, and Seifert was still unconscious when he was taken to the hospital fifteen minutes later. He was seriously burned and was away from work six months.

THOMAS M. BRABHAM (right), the third man in the history of the Southwestern Public Service Co. to achieve an EEI Medal, receives his award from H. E. Sampson, Pecos Valley Division manager.

Shown from left to right are EDGAR HUGGINS, CLAUDE BELL, THOMAS CARTER, and O. J. NARON receiving their Certificates of Assistance from H. E. Sampson. (Photographs on this page by C. H. Annett, Southwestern Public Service Co.)

CARL F. LABMEIER (third from right) displays his EEI Medal and Certificate. Pictured from left to right are F. R. Rauch, vice president; W. R. Weise, assistant manager of Electric Distribution; E. S. Fields, vice president; E. E. Kline, manager of Electric Distribution; A. K. Shofner, who was revived by Labmeier; Everett Stephens, general trouble foreman; C. F. Labmeier; C. L. Trout, superintendent of Electric Distribution; and W. C. Beckjord, president of The Cincinnati Gas and Electric Co.

In recognition of his preparedness and quick thinking, Thomas Brabham received the EEI Medal at a dinner attended by Roswell line crew members and their wives last December 11. At the same time, Certificates of Assistance were awarded to Claude Bell, Edgar Huggins, Thomas Carter, and O. J. Naron. The presentations were made by Mr. H. E. Sampson, Pecos Valley Division Manager of the Southwestern Public Service Co. In presenting the awards Mr. Sampson said, "It is a proud thing for anyone to feel that he had a hand in saving a fellow worker's life. This incident emphasizes that we all have a positive duty to know something about artificial respiration." A Certificate of Assistance issued to B. D. Shaver, who had left the employ of the company, was subsequently delivered to him. An account of the presentations appeared in the January, 1951, issue of the company magazine, *The Southwesterner*.

CARL F. LABMEIER

The Cincinnati Gas and Electric Company

In the darkness that preceded dawn last May 25th, Power Troublemen Alfred Shofner and Carl Labmeier were repairing an underground street light circuit at the entrance of Mt. Airy Park, Cincinnati. Shofner, who was working in a pull box, had been wearing rubber gloves, but he had removed them in order to strip some cambric tape from a dead cable which was being prepared for a splice. However, in stripping off the tape, Shofner came in contact with a bare screw sleeve on an energized temporary splice and received a 1400-volt shock.

The gasps of the stricken troubleman attracted Labmeier's attention. Labmeier, who was wearing rubber gloves, immediately grasped Shofner around the waist, pulled him away from the box, and thus broke Shofner's contact with the live circuit. Shofner, who was unconscious, was breathing irregularly, but in a few seconds his breathing stopped altogether. Labmeier then began the prone pressure method of resuscitation and periodically called for help. But Mt. Airy Park is deserted in the early morning hours, and nobody answered his calls.

In about five minutes Shofner began to breath faintly, and Labmeier continued resuscitation for three more minutes until Shofner was able to breathe normally. Labmeier then placed his injured co-worker in the company truck and drove him to the Good Samaritan Hospital for treatment. Shofner returned to work in about a month.

Carl F. Labmeier was awarded the EEI Medal by Walter C. Beckjord, president of The Cincinnati Gas and Electric Company, in a ceremony held on January 17, 1951. A story on the presentation was featured in the January 24, 1951, issue of the employee newspaper, *O-K News*, and articles dealing with the rescue and the award appeared in Cincinnati papers.

FRED J. FEIGH

Pennsylvania Electric Company

On the morning of August 24, 1950, Lineman Ernest R. Whited and Fred Feigh were applying tar paper to the roof of the Patton, Pa., substation. Two circuits of three-phase, 2300-volt conductors passed through the wall of the substation. One circuit comprised the feed wires from a bank of outdoor transformers, and the other, which was supported by a steel platform attached to the side of the building, was dead-ended on a nearby

W. H. Wade (right) vice president of the Pennsylvania Electric Co., pins an EEI Medal on FRED J. FEIGH. Ernest Whited (left), whose life was saved by Feigh, is shown holding Feigh's Certificate.

ALEX GRITSKE, holding his EEI Medal and Certificate, shakes hands with W. F. Tait, Jr., vice president of the Public Service Electric and Gas Company, as Safety Engineer W. R. Smith (left) and Division Superintendent T. Seely (right) look on.

pole. A cursory examination led the two linemen to believe that this last circuit was deenergized.

Whited had placed his ladder against the side of the building within six inches of the supposedly dead circuit. He and Feigh had just nailed one strip of paper to the roof, and in so doing Whited had stood several times on the platform of this circuit. Then, in order to move into a better working position, Whited stepped on two of the deadended conductors. Suddenly he plunged head first to the ground.

This accident was apparently due to failure to observe the company's safety rule which states specifically "all wires must be treated as 'live' unless disconnected from the source of supply, tested and grounded . . ." The circuit which Whited had thought dead was in fact energized, and it had dealt him a 2300-volt shock.

Feigh ran to the aid of Whited—who was unconscious, not breathing, and bleeding badly from a scalp wound—and immediately began the prone pressure method of resuscitation. He then instructed a witness to the accident to summon a doctor. Whited began to show signs of life after about eight minutes of resuscitation and was able to breathe unassisted after two more minutes of treatment. In the absence of a doctor, a registered nurse from Patton administered first aid to Whited who was then driven in an ambulance to the Miner's Hospital in Spangler, Pa. Whited was absent from work for over three weeks.

Fred J. Feigh received the EEI Medal at a luncheon meeting, Jan. 18, 1951, of the Cambria County crews of the Pennsylvania Electric Co. Vice President W. H. Wade made the presentation at a ceremony in which Ernest Whited also participated. Articles on the rescue and ceremony were carried in the Johnstown and Altoona newspapers on January 22 and 23, 1951.

ALEX GRITSKE

Public Service Electric and Gas Company

On July 9, 1949, Electrician Bernhard Wagenblast, an employee of the Weston Electrical Instrument Company, Newark, New Jersey, was preparing to clean the primary bushings on a three-phase bank of transformers. The transformers, which were located on a gallery of the Weston Company's substation, had been cleared by opening the primary fuse cut-outs.

Mechanics Alex Gritske and Harold F. Carrie, employees of Public Service Electric and Gas, had just completed routine maintenance on the substation oil circuit breaker and were standing under the gallery where Wagenblast was working. Suddenly the noise of an arc echoed through the substation, and Carrie, quickly followed by Gritske, ran upstairs to the gallery. Wagenblast was lying face down under the switchboard.

Gritske attempted to call for help on an extension phone a few feet away but was unable to get a connection. He then returned to the stricken electrician, who was unconscious and not breathing, and began applying artificial respiration. Meanwhile, Carrier ran to summon a doctor and an ambulance.

After three minutes had passed, Wagenblast came to life and began to groan and move his arms. However, resuscitation had to be continued for about five more minutes before he could breathe without assistance. Wagenblast wanted to get up, and it was necessary for Gritske to persuade him to remain quiet until an ambulance arrived a half hour later. Wagenblast was then removed to St. Barnabas hospital for treatment.

Investigation revealed that the feed back from another bank of transformers had energized the transformers on which Wagenblast was working, thus subjecting the electrician to a 2400-volt shock.

On March 28, 1950, at a meeting of 200 of his Electric Department associates, Alex Gritske was awarded the EEI Medal by W. F. Tait, Jr., Public Service Electric and Gas Co. vice president in charge of electric operations. An article on the rescue and the presentation appeared in the company newspaper.

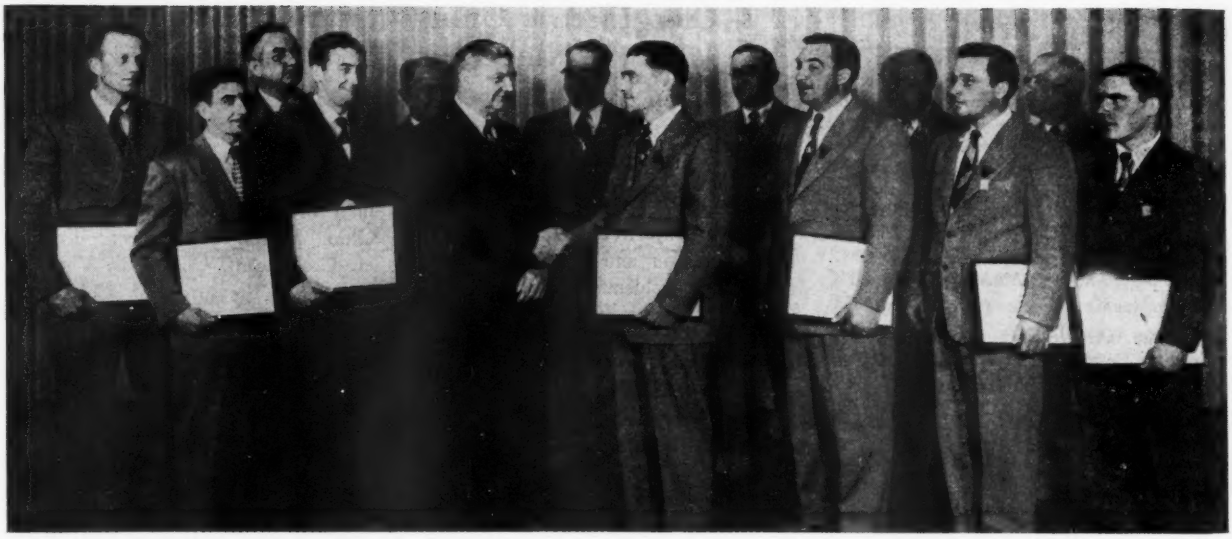
JONATHAN L. RISHEL

Pennsylvania Power and Light Company

Lineman Kenneth E. Heiser, a member of a PP&L line crew, was climbing a pole in Jersey Shore, Pa., last June 20th as Lineman Jonathan Rishel worked below him on the ground. Hearing the sound of an arc, Rishel looked up and saw Heiser cling momentarily to the pole and then fall thirty-six feet to the ground. Heiser had struck his head against an open energized by-pass switch and had received a 6900-volt electric shock.

Rishel ran to Heiser, noted that he was not breathing, and immediately began the prone pressure method of artificial respiration. He then directed other members of the crew to loosen Heiser's clothing, remove his hooks, and clear his mouth. The crew foreman, who was at the Jersey Shore Substation 1000 feet distant, was notified of the accident, and he summoned a doctor.

Rishel began resuscitation approximately one minute after the accident occurred and continued it for from twelve to fifteen minutes before Heiser was breathing without assistance. When Rishel stopped resuscitation, Heiser's respiration became weak, and Rishel resumed prone pressure until the doctor arrived. Heiser was then rushed in an ambulance to the Jersey Shore Community Hospital. Rishel accompanied the



Members of Pennsylvania Power and Light Co. line crews receive congratulations for their EEI awards. Reading from left to right: R. D. ZIEGLER and LYNNE S. KENDIG, winners of Certificates of Assistance; H. R. Taylor, safety instructor; R. F. KINDRED holding his Certificate of Assistance; G. M. Keenan, company vice president; C. E. Oakes, president; D. E. Albertson, safety engineer; D. M. Healy, former EEI Medal winner (see the January, 1951, issue of the Bulletin); H. Ferguson, vice president; J. R. KENDIG, recipient of an EEI Medal; D. J. Zimmerman, safety instructor; J. J. ADAMIRE, EEI Medal winner; E. G. Sandherr, safety instructor; and J. L. RISHEL, JR., EEI Medal recipient.

injured man in order to apply any further artificial respiration that might become necessary.

Despite Rishel's successful resuscitation of his twenty-three year old co-worker, Heiser never regained consciousness. He died two days later in the Jersey Shore Hospital.

Jonathan Rishel was awarded the EEI Medal by Pennsylvania Power and Light Company Vice President George M. Keenan in a ceremony held last Dec. 27th. At the same occasion, 5 other PP&L employees received EEI Medals or Certificates of Assistance for actions which are described further on in this article. An account of Rishel's presentation was featured in the Dec. 28, 1950, edition of the Allentown *Evening Chronicle*.

JOHN R. KENDIG

Pennsylvania Power and Light Company

In the early afternoon of July 11, 1950, near Reinholds, Pa., a crew was stringing in lines for a three-phase, 12-kv service above three 4600-volt wires. Lineman Edgar Weaver was on a pole tying in two 4.6-kv conductors, and Lineman John Kendig and Foreman Raymond Zeigler were standing below him by the company truck. Zeigler heard the harsh sound of an arc, and instantly looked up to find Weaver motionless, his hands cupped over an insulator. As Zeigler called to him, Weaver slumped into his belt. Weaver had been shocked by the sharp end of a tie wire which had punctured the leather protector and rubber glove on his left hand.

Zeigler instructed Kendig, who was wearing his hooks, to climb the pole and start giving Weaver pole top resuscitation. The foreman then ordered Lineman R. F. Kindred, who was on a nearby pole, to come down and assist Kendig. Weaver had lost consciousness and was not breathing, and Kendig applied artificial respiration for five minutes before Weaver was able to breathe without assistance. Putting on hooks, Zeigler then ascended the pole and helped Kendig and Kindred lower Weaver to the ground.

While Weaver was being made comfortable on a first aid blanket, Zeigler went to a house about 100 feet down the road to telephone a doctor, who arrived within a few minutes. Weaver was examined and then taken to a hospital in Lancaster, Pa.

John R. Kendig received the EEI Medal for successful resuscitation, and Raymond M.

JONATHAN L. RISHEL, JOHN R. KENDIG, and JAMES J. ADAMIRE (left to right) receive their EEI Medals for successful resuscitation. G. M. Keenan, vice president of the Pennsylvania Power and Light Co., made the presentations.

Zeigler and Raymond F. Kindred were awarded Certificates of Assistance in a ceremony presided over by company Vice President George M. Keenan last Dec. 27. Accounts of the accident and the presentations were carried in the July 12, 1950 issue of the Lancaster *Intelligencer Journal;* the Dec. 28, 1950, issue of the *Lancaster New Era;* the Dec. 28, 1950, issue of the Allentown *Evening Chronicle;* and the December 29, 1950, issue of the *Intelligencer Journal.*

JAMES J. ADAMIRE

Pennsylvania Power and Light Company

On the morning of September 12, 1950, Lineman Herman J. Brown was preparing to lower a crossarm on a pole in the village of Durlach, Pa. In endeavoring to throw the end of a rope sling over a crossarm which was above him, Brown contacted an energized 4.6-kv phase wire with his left hand and collapsed in his safety belt. Hearing him groan, his groundman shouted for help to other members of the crew who were working 500 feet away on a transformer structure.

Linemen James Adamire and Lynne Kendig reached the pole at the same time, and Adamire started up the pole immediately followed by Kendig. Brown, suffering from electric shock, was unconscious and not breathing. While Adamire administered pole top resuscitation, Kendig fastened a hand line around Brown by which crew members on the ground moved the stricken lineman into a position on the pole where artificial respiration could be given with greater ease. Another member of the crew ran to summon a doctor.

Brown showed signs of life within two or three minutes and was breathing without assistance in about five minutes. Adamire and Kendig then lowered him to the ground where he was made comfortable on the porch of a nearby residence. A doctor arrived on the scene shortly after the accident occured, and he ordered Brown to the Ephrata Community Hospital for treatment. Brown was absent from work for six weeks.

James J. Adamire received an EEI Medal and Lynne S. Kendig a Certificate of Assistance in a ceremony held at the Livingston Club, Allentown, Pa., on Dec. 27, 1950. George M. Keenan, Vice President of Pennsylvania Power and Light, made the presentations. Articles on the rescue and the awards were featured in the Sept. 12, 1950, *Lancaster New Era,* the Dec. 28, 1950, Allentown *Evening Chronicle,* and the Dec. 29, 1950, Lancaster *Intelligencer Journal.*

ARTHUR S. HOGAN

Northern States Power Company

Near the township of Cottage Grove, Minn., on June 17, 1949, Apprentice Lineman Richard Thill was on a pole cutting over a rural line from a 2.4-kv transformer, which was to be removed, to a 7.2-kv transformer. The secondary sides of both transformers were tied together. Lineman Arthur Hogan, who was in charge of the two-man crew, was starting to climb the pole when he saw Thill fall limply into his belt. Unknown to Thill, the 2.4-kv line was energized, and the apprentice lineman had received a feed-back of 7200 volts to ground. Hogan quickly moved up under Thill, grabbed the injured lineman's loose clothing, and pulled him clear of electrical contact. Jockeying into position behind Thill, who was not breathing, Hogan began to administer pole top resuscitation. After about twelve minutes of this treatment, Thill was again breathing normally.

Hogan dropped his pliers to a farmer who had witnessed the accident and instructed him to cut down a nearby wire clothesline. After attaching it to the victim's D-ring, Hogan placed the wire over a pole step, and he and the farmer lowered Thill by means of this improvised hand line. Hogan then applied prone pressure until he was certain that Thill could breathe totally unassisted.

Thill was taken in an ambulance to a hospital in St. Paul where he was treated for mild shock and severe injuries to his right thumb. Thill returned to work in ninety days.

The EEI Medal for successful resuscitation was authorized for presentation to Arthur S. Hogan on October 28, 1949. Lineman Hogan unfortunately suffered an off-the-job accident before a suitable ceremony could be arranged, and no formal presentation of the medal was made.

GEORGE AMMON

Duquesne Power and Light Company

In the early afternoon of July 12, 1947, a line crew was working on three-phase installation in Ambridge, Pa. Lineman Edward Quig was on a forty-five foot pole attempting to secure a phase wire on a double-arm dead end. The wire, which was attached to a hand line, had just been pulled taut by winch truck operator Paul Lanning, and Quig had put one turn of the wire around the insulator. When Quig turned slightly to look back at the wire, he suddenly slumped into his belt.

Lanning noticed Quig's limp form and shouted to Lineman George Ammon who came down from his position on an adjacent pole. Climbing up under Quig, who was unconscious and not breathing, Ammon noted that the stricken lineman was not in contact with a live circuit and immediately began pole top resuscitation.

Meanwhile, Lanning ran to get help from another line crew which was working several blocks away. After three or four minutes of resuscitation, Quig began to show signs of life, but it was necessary to continue artificial respiration for about six more minutes before he could breathe unassisted. Members of the other crew arrived just as Quig regained consciousness, and they helped Ammon lower the injured lineman to the ground.

Quig was driven in an ambulance to the Valley Hospital, Sewickly, Pa., where examination revealed a burn on his right arm. It is assumed that in turning around he had brushed his arm against the exposed end of the phase wire, thereby contacting the live circuit.

George Ammon was given the EEI Medal on February 23, 1950, by Duquesne Light Co. Vice President W. G. Gens. Duquesne's General Superintendent of Distribution, E. W. Oesterreich, the originator of the pole top method of resuscitation, assisted in the presentation of Mr. Ammon's award. An account of the ceremony was featured in the March, 1950, issue of the company paper, *Public Service.* This is the second such award Mr. Ammon has received, for he won the EEI Medal in 1944 for the resuscitation of a fellow worker.

Ohio Electric Utility Institute Established by Nine Electric Companies

FORMATION of the Ohio Electric Utility Institute by the state's nine principal electric power companies has been announced by the participating companies.

General objectives include interchange of information and ideas with respect to various problems of utility management and operation for the benefit of the industry in keeping it prepared to meet the constantly increasing demands of its customers for an ample, adequate and reasonably priced supply of electric energy, and also to meet the power requirements of the nation's rearmament program.

Charter members are: Central Ohio Light & Power Co., The Cincinnati Gas & Electric Co., The Cleveland Electric Illuminating Co., the Columbus & Southern Ohio Electric Co., The Dayton Power & Light Co., Ohio Edison Co., The Ohio Power Co., The Toledo Edison Co., and Marietta Electric Co.

The Institute's 1951 officers are: President, Harold Turner, Canton, Vice President and General Manager of The Ohio Power Company; Vice President, R. E. Burger, Akron, Chairman of the Executive Committee of Ohio Edison Company; Treasurer, H. C. Vincent, Columbus, Vice President and Treasurer of Columbus & Southern Ohio Electric Company.

J. B. Johnson of Elyria has been appointed Manager Secretary of the Institute. Mr. Johnson has been active in the public utility industry in Ohio for more than 35 years and was a Vice President and Director of the former Ohio Public Service Company and Manager of the Elyria Division. He will continue his present position as Manager of the Elyria Division of Ohio Edison for the present but plans to sever his connection at a future date to devote his entire time to the work of the Institute from an office to be opened in Columbus.

Fourth Regional Conference of EEI Rural and Urban Development Committee Held in New Orleans

COMMUNITY development programs and problems were given full consideration by representatives of some 20 electric companies serving the South and Southwest at the fourth regional conference sponsored by the EEI Rural and Urban Development Committee in New Orleans, Jan. 24 and 25. During the year since its organization in January, 1950, the Committee, headed by Chairman George R. Keegan of Western Massachusetts Electric Company, has sponsored similar regional conferences in Boston, Cleveland and Minneapolis.

Scope of Conference

The New Orleans conference, with Fred A. Elliston, territorial development manager of Texas Electric Service Company as chairman, included among its presentations a review of the Middle South Area Development program, a luncheon address by a prominent educator on the future of the South, as well as descriptions of individual company programs and a symposium of reports from the chairmen of the four subcommittees of the Rural and Urban Development Committee.

After Mr. Elliston opened the conference with a welcome to the delegates, Mr. Keegan briefly reviewed the objectives of the Committee, emphasizing that the "activities of this Committee have no immediate connection with kilowatthour sales as such." In studying, compiling and exchanging information with respect to programs and materials used by electric companies to aid in the development of their service areas, the Committee's work has to do with all of the various elements in broad programs designed to improve the general economic levels of communities.

Activities of Middle South Program

Louis M. Tognoni, director of the Middle South Area Office in New Orleans, then outlined the activities and scope of the Middle South program, explaining that it is sponsored jointly by four electric companies — Arkansas Power and Light Co., Louisiana Power and Light Co., Mississippi Power and Light Co. and New Orleans Public Service Inc. He said that the term "Middle South" was created to give single identity to the three neighbor states—Arkansas, Louisiana and Mississippi—effectively "packaging" the tri-state area and making it easier to carry out the development program on a regional basis.

Stimulate Economic Development

Middle South's main purpose is to stimulate the economic development of the geographic area through the promotion of industry, commerce and agriculture. To achieve this end, the advantages and potentialities of the area are analyzed and promoted nationally and locally through newspaper and magazine advertising, direct mail, and personal presentations by such means as visualizers and charts.

In emphasizing the cooperative basis of the Middle South program, Mr. Tognoni pointed out that Middle South works actively with state and local agencies and organizations having similar interests. A "grass-roots" foundation for the regional program is provided at the community level by the four sponsoring electric companies, each of which has a definite agricultural and industrial development program designed for the specific area it serves.

Assist Small Businessmen

Another phase of development work in the South was treated by S. L. Drumm, vice president and general sales manager of New Orleans Public Service, Inc., in his discussion of the Defense Production Council set up in New Orleans for the purpose of assisting the small businessman to stay in business under conditions of national emergency. The Council was organized, with the help of the utilities, as part of the New Orleans Chamber of Commerce.

Following the first session, the delegates heard an address by Dr. Robert W. French, Dean, College of Commerce and Business Administration, Tulane University, at a luncheon meeting. Dr. French, in discussing "The South's Future in Education, Culture and Industry," gave in some detail the bases for his belief in the bright prospects of the southern states.

Three motion pictures in color were also features of the New Orleans conference. Two of these films, "Georgia's Green Gold" and "Power of the South," were presented by R. T. Wardle, Jr., community development manager of Georgia Power Co., and the third, "West Texas in Action," was shown by Mr. Elliston. In discussing "Georgia's Green Gold," which deals with year-round pastures for livestock raising, Mr. Wardle noted that the film was produced at low expense by a division of the state education department in cooperation with Georgia Power. "Power of the South," a film with broader development aims, surveys southern resources, industry and agriculture, and was produced by Georgia Power's parent, The Southern Company. "West Texas in Action" portrays the advantages of the area served by Texas Electric Service Co.

Programs of Individual Companies

The afternoon of the first day and most of the second day were devoted principally to the presentation of individual company programs. Those who discussed their companies' development activities included: W. I. Dolbeare, Virgina Electric and Power Co.; R. K. Barratt, The Empire District Electric Co.; J. R. Lester, Alabama Power Co.; A. R. Kennedy, Central Power and Light Co.; H. C. Leonard, Gulf States Utilities Co.; R. T. Nash, Central Louisiana Electric Co.; C. A. Tatum, Dallas Power and Light Co.; R. H. Giedd, Florida Power Co.; T. J. Sullivan, Florida Power and Light Co.; F. M. Kimball, Kansas Gas and Electric Co.; L. A. Johnston, Gulf Power Co.; H. S. Hinrichs, Kansas Power and Light Co.; A. H. Gray, Southwestern Gas and Electric Co.; T. B. Ferguson, Texas Power and Light Co.; Mr. Elliston; and Mr. Wardle.

Symposium Speakers

In the symposium which took place at the conference's final session, J. F. Gaskill of Philadelphia Electric Co., chairman of the Industrial Development Subcommittee, was the first speaker. Mr. Gaskill emphasized the part played by good industrial customer relations in the retention of existing industry, and set

(*Continued on page* 61)

Accident Prevention Committee Meeting

W. T. Rogers, *Chairman*

THE winter meeting of the Accident Prevention Committee was held Jan. 15 and 16 at the Lord Baltimore Hotel, Baltimore, Md. The 50 members and guests were welcomed by Charles P. Crane, president of the Consolidated Gas, Electric Light and Power Company of Baltimore, who commended the committee on the service it is rendering to the industry. Despite these efforts, however, he noted the need for still further improvement since the industry's accident frequency rate for 1949 was still about 40 per cent above the average for all industry. In addition to the humanitarian and economic aspects of accident prevention, he observed that the associated conservation of manpower now assumes added importance.

Accident Survey

H. J. Crisick presented a sample survey of accident experience for 1950. Preliminary data from 27 companies represented on the Accident Prevention Committee, comprising almost half of the total employees in the industry, showed encouraging reductions of 22 per cent in frequency and 33 per cent in severity. A summary of these data compared with corresponding data for the same group of companies for the preceding year follows:

	1950	*1949*
Man-hours	273,826,995	273,295,150
Fatalities	37	54
Frequency Rate	10.49	13.48
Severity Rate	1.07	1.59

Substantial Improvement

Although the accident rates for this group are consistently somewhat lower than those for the entire industry, previous experience indicates that the trend toward substantial improvement probably was experienced in smaller degree throughout the industry, and promises to result in the lowest industry frequency rate since 1944.

D. C. Stewart gave further details from the completed review and classification of fatalities occurring in 1949 and stressed the continuing high percentage of hand contacts while performing line work on poles, which consistently accounts for about one of every seven fatalities and which could be almost completely eliminated by strict adherence to a rule of always wearing gloves in the primary area. Mr. Stewart's presentation on this subject at the last meeting, together with the detailed tabulation of 1949 fatalities, appears on page 47 of this issue of the BULLETIN.

Resuscitation Techniques

Wills Maclachlan referred to a report in the Dec. 23, 1950, issue of the *Journal of the American Medical Association* describing a combination of the Schafer and Emerson artificial respiration techniques which produces a greater ventilation of the lungs. Mr. Maclachlan pointed out that the record of successful resuscitations using the relatively simple Schafer method indicates that sufficient ventilation is provided by this method alone and he considers the suggested combination method too complicated and tiring to the operator to be practical.

A new intermittent positive pressure resuscitator known as the Pneolator was demonstrated by Mine Safety Appliances Co. Other new devices shown included locking-type snap hooks for safety straps and a flashlight with lucite head which can be switched to show either red or green for signalling traffic at night.

An unusual accident which occurred when a parked and braked truck slipped on an ice-covered grade was described. Several accidents due to the misuse of ladders were noted, and continued difficulty in obtaining satisfactory ladders is being experienced. One company rejected 75 per cent of 400 ladders purchased for emergency use as a result of the Nov. 25 hurricane. Two companies require metal rods under rungs.

Hazardous Television Installations

A. S. Hancock described measures taken by his company to reduce the number of hazardous television antenna installations. Letters were sent to all known television installers and a report form for notation of hazardous installation by employees was established. Owners have cooperated in correcting hazardous installations in all but three or four of the 125 cases reported to date.

A. H. Doud presented three new posters for the Committee's series on industry safety which were approved for release.

A report from I. R. Dohr indicated good progress on the proposed revision of ASA specifications for rubber gloves.

A letter from T. R. Claffy of W. H. Salisbury and Co. outlined the progressively tighter restrictions being placed on the consumption of natural rubber. However, he does not anticipate any serious interference with the production of standard quality rubber goods for linemen's use.

H. E. Hatfield presented for discussion a new draft of the proposed field manual on the care and use of hot line tools.

E. J. Kreh announced plans for preparation of package material emphasizing summertime hazards which the subcommittee hopes to have available for the industry by May 1. This is to include a general safety talk and a series of leaflets for linemen, discussion outlines for foremen and posters covering six specific subjects.

Round Table Discussion

Round table discussion conducted by R. P. Douglas covered varied topics. Most members agreed that man-hours and accidents for line gangs loaned to other companies during storm emergencies should be included in the statistics of the original company. While none of the companies represented permit attachment of signs to poles, most have difficulty with unauthorized attachment or with equally hazardous installation on separate standards very close to the pole. Discussion of storage and handling of explosives revealed that many companies do their own blasting, while others contract for such work.

Defense Power Changes Title

Secretary of Interior Oscar L. Chapman has signed an order changing the title of the Defense Power Administration to that of "Defense Electric Power Administration." The change in name was made at the request of Defense Power Administrator C. B. McManus, in order to avoid the conflict in identities arising from the fact that the recently created Defense Production Administration has the same initials as the Defense Power Administration. Under its new name, for purposes of brevity, Defense Power will henceforth be identified by the initials "DEPA."

RECENT EEI PUBLICATIONS

EEI-NEMA Standards for Voltage Classification of Luminaires Used in Street and Highway Lighting

EEI Publ. No. TDJ-133, January, 1951. A report of the Joint Committee of the Edison Electric Institute and the National Electrical Manufacturers Association on Standardization of Street Lighting Equipment. 4 pages. Price: 10 cents per copy.

These standards cover two voltage classifications for luminaires used for street and highway lighting service. They also cover the general methods of dielectric testing for these two voltage classifications.

These standards apply to the electrical insulation between ungrounded current-carrying members and non-current-carrying members which may be grounded by design or accident.

EEI-NEMA Standards for Pendant Luminaire Mounting Used in Street and Highway Lighting

EEI Publ. No. TDJ-134, January, 1951. A report of the Joint Committee of the Edison Electric Institute and the National Electrical Manufacturers Association on Standardization of Street Lighting Equipment. 4 pages. Price: 10 cents per copy.

These standards cover standard features of luminaires for lighting streets and highways that pertain to their attachment to luminaire supports.

The features covered apply to pendant-type luminaires that are either top or single side mounted.

Specifications for Impregnated-Paper-Insulated, Lead-Covered Cable, Oil-Filled Type (5th Edition)

EEI Publ. No. 51-4. Specifications prepared by the Cable Engineering Section, Committee on Power Distribution, Association of Edison Illuminating Companies in consultation on technical provisions with engineers of the Manufacturers of Oil-Filled Cable. 37 pages. Price: Single copies $1.00; 1000 or more, 85 cents per copy.

The specifications are intended to apply to impregnated-paper-insulated, lead-covered cable of the low-pressure oil-filled type, which is to be used for the transmission and distribution of electrical energy.

The tests in the specification apply only to oil-filled cable with single lead sheath, with double lead sheath or with lead sheath having reinforced non-metallic coverings over the sheath.

The purpose of the specifications is to insure the furnishing of cable of high quality.

Specifications for Guy Thimbles

EEI Publ. No. TD-13, 1950. Specifications approved by the Transmission and Distribution Committee, Edison Electric Institute, to supersede NELA Specification D300-22. 5 pages. Price: 10 cents per copy.

These specifications cover guy thimbles commonly used in overhead line construction.

EEI-NEMA Standards for Series Sockets and Series-Socket Receptacles Used in Street and Highway Lighting

EEI Publ. No. TDJ-136, January, 1951. A report of the Joint Committee of the Edison Electric Institute and the National Electrical Manufacturers Association on Standardization of Street Lighting Equipment. 7 pages. Price: 10 cents per copy.

These standards cover the following equipment for luminaires for lighting streets and highways:

1. Series sockets having medium impact-strength and intended for service at high temperatures.
2. Series sockets having high impact-strength and intended for service at limited temperatures.
3. Series-socket receptacles in the 5000-volt classification.

EEI-NEMA Standards for Filament Lamps Used in Street and Highway Lighting

EEI Publ. No. TDJ-131, January, 1951. A report of the Joint Committee of the Edison Electric Institute and the National Electrical Manufacturers Association on Standardization of Street Lighting Equipment. 4 pages. Price: 10 cents per copy.

These standards cover certain filament lamps used for lighting streets and highways. The lamps covered are for series or multiple operation of ratings from 1000 to 15,000 lumens.

EEI-NEMA Standards for Photometric Tests for Luminaires Used in Street and Highway Lighting

EEI Publ. No. TDJ-132, January, 1951. A report of the Joint Committee of the Edison Electric Institute and the National Electrical Manufacturers Association on Standardization of Street Lighting Equipment. 4 pages. Price: 10 cents per copy.

These standards cover a uniform method of making photometric tests on luminaires intended for lighting streets and highways. A method of presenting the technical data obtained from such tests is also given.

Fourth Regional Conference of EEI Rural and Urban Development Committee

(*Continued from page* 59)

forth factors to be considered in obtaining new industry. When completed, his committee's report will include an analysis of a number of electric company industrial development programs.

The report of P. V. Hayden, chairman of the Civic Development Subcommittee, was read in his absence by Mr. Keegan. It covered the role of electric utilities in such community activities as planning and zoning, school and education programs, cultural improvements and physical betterment in matters of traffic, housing, hospitals, playgrounds, and "paint up and clean up." Listing and evaluation of different activities is given as a goal of the Committee.

Natural Resources

In the Natural Resources and Agricultural Development Subcommittee, Chairman Wardle said that attention is being given primarily to problems of river basin development. The Committee plans to collect information on areas in which private initiative has been primarily instrumental in basin improvement work, so that a comprehensive report on this subject may be compiled and distributed.

As chairman of the Travel and Recreational Development Subcommittee, J. H. Jones of Monongahela Power Co. described to the delegates the possible benefits to electric companies which lie in travel and recreation activities. The travel and recreation business is one of the nation's largest industries, Mr. Jones pointed out, and his committee is exploring ways in which the electric utilities may, through development work in this field, bring increased prosperity and good will both to the community and the utility.

The Rural and Urban Development Committee intends to complete its country-wide coverage of electric company development work in two more regional conferences—one in March for the electric utilities of the Middle Atlantic states and one at a later date for the electric utilities of the West which have not been included in the other meetings.

PERSONALS

AUSTIN D. BARNEY, president of The Hartford Electric Light Co. and the Connecticut Power Co., was awarded the honorary degree of doctor of engineering at the 144th commencement of Rensselaer Polytechnic Institute.

The citation for Mr. Barney's honorary degree read, in part, as follows: "Public utilities executive and civic leader. Electric power has been in Mr. Barney's family for three generations. How a man can carry the duties of president of The Hartford Electric Light Co. and the Connecticut Power Co., and of president or director of several other manufacturing and banking concerns, and then add the civic responsibilities for which he is known in his community, is not to be explained in electrical terms only. In his town and in the larger community of Hartford, he has been an acknowledged leader in all good works for public welfare."

Mr. Barney, who is widely known in the industry, served as a director of the EEI from 1947 to 1950.

HARLLEE BRANCH, JR., has been elected president of the Georgia Power Co. succeeding C. B. MCMANUS, who now becomes chairman of the newly created executive committee of the Board of Directors, and also a vice president of the company. Recently appointed administrator of the Defense Power Administration, Department of Interior (EEI BULLETIN, January, 1951), Mr. McManus has consequently relinquished his former administrative duties with the Georgia Power Co. although he will continue as president of The Southern Co.

In addition to Mr. McManus, the other members of the executive committee elected by the board of directors are: D. MACDOUGALD, chairman of the board, Mr. BRANCH, E. A. YATES, chairman of the board of The Southern Co. and vice president of Georgia Power, MILLS B. LANE and JOHN A. SIBLEY.

Mr. Branch has been vice president and general manager of Georgia Power since August, 1949. Before that he was associated with the company for 18 years as a member of the firm of MacDougald, Troutman, Sams and Branch, general counsel for the company.

MR. BRANCH

Mr. Branch attended Davidson College and Emory University, receiving his law degree in 1931. He was engaged in the practice of law until he joined Georgia Power as vice president and general manager in 1949. He is active in local civic affairs and was general chairman of the 1950 fund-raising campaign for the Community Chest. During the recent war he served as a lieutenant in the U. S. Navy.

WINTHROP E. MANGE has been elected an assistant vice president of the Consolidated Edison Company of New York, Inc. Along with his new duties Mr. Mange will continue to serve as president of Staten Island Edison Corporation, a post he has held since 1938.

HAROLD I. SHAKESHAFT, who has been assistant general manager as well as vice president of Staten Island Edison, now takes over the title and responsibilities of general manager, until now held by Mr. Mange.

Mr. Mange began his utility career with the former Associated Gas and Electric System in 1922 as an engineer for New York State Electric and Gas Co. After a short stay with Staten Island Edison, he became general manager of Cape and Vineyard Electric Co. from 1927 to 1930 and then general manager of New Bedford Gas and Edison Light Co. He returned to Staten Island Edison in 1937 as vice president and general manager, and later became a director of the Company. Mr. Mange earned an M.E. degree at Cornell University in 1922.

Mr. Shakeshaft has been with Staten Island Edison since 1935. After his graduation as electrical engineer from University of Pennsylvania in 1920, he served in various executive capacities for Associated Gas and Electric companies, chiefly in Rochester, Binghamton and Elmira. Mr. Shakeshaft is also a director of Staten Island Edison.

ROBERT G. ELY has been named director of sales for The Connecticut Light and Power Co. Mr. Ely, who for some years directed sales work for the Public Service Electric and Gas Co., will begin his new duties on Feb. 15.

HOWARD W. MEMMOTT, industrial power engineer in the company's Eastern division, has been appointed industrial manager for the company and will join the sales staff in Waterbury.

Mr. Ely received his mechanical engineering degree from Cornell University in 1926. He joined Public Service Electric and Gas Co. in September of that year. After power sales experience in Jersey City and Newark, he took charge of power sales in the Jersey City district in 1933. In 1937 he was named assistant manager of power sales for the company.

Mr. Ely is vice chairman of the EEI Commercial Division General Committee and chairman of the Industrial Power and Heating Section of the Edison Electric Institute and has been a member of the section since 1941. He has served as chairman of the Interstate Power Club and as a member of the board of directors of that organization for several years. He is also a member of the Oil Engine Power Cost Subcommittee of the American Society of Mechanical Engineers and of the Materials Handling Society of New Jersey.

Mr. Memmott received his degree in electrical engineering from Brown University in 1933. Prior to joining CL&P he was employed by the Connecticut State Highway Department in New Canaan, and the Cherry and Webb Broadcasting Co., in Providence.

In 1937 he became industrial power engineer in the CL&P Danielson district, and in 1949, became industrial power engineer for the entire Eastern division. Mr. Memmott is chairman of

the New England Power Engineers Association.

FRED I. SMITH has been appointed sales manager for Jersey Central Power & Light Co.

In 1946, Mr. Smith joined JCP&L after many years of service in engineering and sales fields with an affiliated company. He was industrial sales manager before his recent promotion.

He is a graduate of the Pennsylvania State College, and holds a Bachelor of Science degree in electrical engineering. From 1940 through 1943, Mr. Smith instructed in elementary electricity and other related subjects in a course offered at a branch of the Pennsylvania State College. This course was designed to prepare students for entry into war plants and other defense work.

E. D. CHAPMAN has been appointed manager of the newly created western division of The Ohio Power Co. The division was formed by consolidating the company's northern and Lima divisions.

GUSTAV F. WATTERS, vice president and director of Niagara Mohawk Power Corp. and administrative officer of its western division, will expand his duties on a system-wide basis and transfer his office from Buffalo to Syracuse. Mr. Watters has been with Niagara Mohawk since 1935. Following three years as a major in the Army Ordnance Department, he returned to Buffalo as an assistant vice president of Buffalo Niagara Electric Corp. and in 1947 was made an executive vice president and director of the Niagara Falls Power Co. Upon the formation of Niagara Mohawk, he was named a vice president and director of the new consolidated operating company.

HOWARD C. FULLER has been named manager of the St. Lawrence district of the Niagara Mohawk Power Corp. His headquarters will be located at Potsdam, N. Y. Mr. Fuller formerly was power engineer for the electric company at Utica. He succeeds REGINALD H. STRATTON who has been appointed executive assistant to Leland D. McCormac, a vice president of the company. Both appointees are veterans in the service of Niagara Mohawk and its predecessors.

HENRY L. MACINTIRE, senior commercial and industrial representative for the western division of Niagara Mohawk Power Corp., has been named manager of the company's Rome district. He succeeds A. FLOYD WRAY, who recently was appointed manager of the company's Niagara Falls district.

LEE M. MOORE has joined Columbus & Southern Ohio Electric Co. as special engineer. He had been employed by the consulting engineering firm of Louis T. Klauber & Associates in Philadelphia and earlier by the Rural Electrification Administration in the technical standards division, and by Alabama Power Co.

JOHN LLOYD, JR., and HOWARD H. MELVIN have been elected to the board of directors of Atlantic City Electric Co. At the same time the election of ANTHONY C. VENCE as secretary and of ROBERT W. HOGG as treasurer of the Company, was announced.

Mr. Lloyd, who succeeds the late EUGENE L. WHITE as a member of the board of directors, has been connected with the Company for 23 years through the law firm of Lloyd and Horn, company counsel, and its predecessor, Thompson and Hanstein. Mr. Lloyd graduated from the University of Pennsylvania and received his L.L.B. from Harvard Law School. He was admitted to the New Jersey Bar in 1927.

Mr. Melvin, who succeeds the late ALBERT C. GOEBEL on the board, is a well-known New Jersey public utility executive. He is executive vice president of the Millville Electric Light Co. He is also former president of the New Jersey Utilities Association and the New Jersey Gas Association.

Mr. Vence, who succeeds Mr. Goebel as secretary, started with the Company in 1923 in Bridgeton, N. J. In 1929 he joined the audit staff of the Company and was transferred to Atlantic City and has since served in various accounting capacities. In 1948 he was elected assistant secretary-assistant treasurer.

Mr. Hogg, who was elected as the Company's new treasurer, has served in various positions in the Accounting Department for many years. He was elected assistant secretary-assistant treasurer in 1948.

N. E. FUNK, past vice president of the Philadelphia Electric Co. and present chairman of the Philadelphia Highway Traffic Board, has been awarded an Honorary Membership in the Engineer's Club of Philadelphia. The award, which was presented at the recent Mid-Century Dinner of the Engineer's Club in Philadelphia, was made in recognition of Mr. Funk's "outstanding achievements in the world-wide field of Engineering and international power exchange relations." Mr. Funk is chairman of the EEI Subcommittee on Continuity of Service Protection of the Electric Power Survey Committee.

Fatal Accidents

(*Continued from page* 51)

tools," but to try to induce the industry to pick them up and use them.

Considerable work has been done through the years along these lines. Responsible people in the industry have said from time to time that it has been good work. But the present record says pretty clearly that these techniques are not enough.

Basically, progress must come from realization within individual companies (particularly those which have been lagging) that their people do not need to die from accidents. When strong leadership appears within the individual company, accidents and deaths from accidents decline. But strong leadership is also needed industry-wide if individual companies are to be stimulated to greater effort.

Somewhere within the industry strong leadership must emerge; leaders who will tackle the problem of convincing the industry that it is not now paying the price of safety, but that it cannot afford *not* to pay that price; and that, measured against human values or dollars or any other standard whatever, the price is small indeed.

Several presidents of the EEI and other executives have at various times turned their attention to the industry's problem and have aided. More of such effort is needed, much more. Perhaps within the top councils of the EEI, some person or persons, with unbounded zeal for the cause, will make it one of the principal aims of his life to help promote and encourage the accident prevention effort industry-wide. Such leadership, sincere, respected, listened-to and everlastingly vocal for the conservation of life and the prevention of suffering and loss from accidents, could work wonders.

CONVENTIONS AND MEETINGS

1951

FEBRUARY

1-2 Pennsylvania Electric Association, Transmission and Distribution Committee, William Penn Hotel, Pittsburgh, Pa.
1-2 EEI-AGA Taxation Accounting Committees, Hotel Netherland Plaza, Cincinnati, Ohio.
7-8 EEI Commercial Lighting Committee, Hotel Statler, Detroit, Mich.
8-9 EEI Prime Movers Committee, Atlanta Biltmore Hotel. Atlanta, Ga.
8-9 Missouri Valley Electric Association, Industrial and Commercial Sales Conference, President Hotel, Kansas City, Mo.
9 PIP, Steering Committee Meeting, Hotel Biltmore, New York, N. Y.
12-13 EEI Electrical Equipment Committee, Hotel Cleveland, Cleveland, Ohio.
13-14 EEI Wiring & Specifications Committee, Sheraton-Gibson Hotel, Cincinnati, Ohio.
14 PIP Mid-Atlantic Regional Meeting, Baltimore, Md.
15 EEI Market Development & Electrical Applications Committee, EEI Headquarters, New York, N. Y.
15-16 EEI Home Service Committee, EEI Headquarters, New York, N. Y.
15-16 EEI Transmission and Distribution Committee, Atlanta Biltmore Hotel, Atlanta, Ga.
15-16 Pennsylvania Electric Association Relay Committee Meeting, Hotel Roosevelt, Pittsburgh, Penn.
15-16 Seventh Annual Adequate Wiring Conference, Sheraton-Gibson Hotel, Cincinnati, Ohio.
19-20 National Association of Purchasing Agents Mid-Winter Conference, Pittsburgh, Pa. (Press Headquarters, William Penn Hotel).
19-21 Canadian Electrical Association, General Division, Eastern Zone, Seigniory Club, Que.
21-24 American Society of Civil Engineers, Spring Convention, Houston, Tex.
27 North Central Electric Association, Central Station Conference, Hotel Nicollet, Minneapolis, Minn.
28 Industrial Relations Committee, Palmer House, Chicago, Ill.

MARCH

1-2 Canadian Electrical Association, Engineering and Operating Division Sections, Western Zone, Royal Alexandra Hotel, Winnipeg, Man.
5-7 Canadian Electrical Association, Sales and General Divisions Sections, Western Zone, Bessborough Hotel, Saskatoon, Sask.
8-9 Pennsylvania Electric Association, Prime Movers Committee, Berkshire Hotel, Reading, Pa.
12-15 NEMA Annual Meeting, Edgewater Beach Hotel, Chicago, Ill.
21-22 EEI Industrial Relations Committee, joint with Personnel Practice Committee, AGA, and New England Utility Personnel Association, Managers Conference, New England Gas Association, Boston, Mass.
29-30 Oklahoma Utilities Association, Annual Convention, Mayo Hotel, Tulsa, Okla.
29-30 Southeastern Electric Exchange, Engineering and Operation Section, Vinoy Park Hotel, St. Petersburg, Fla.

APRIL

2-5 17th Annual EEI Sales Conference, Edgewater Beach Hotel, Chicago, Ill.
2-5 ASME Spring Meeting, Atlanta Biltmore Hotel, Atlanta, Ga.
4-6 Missouri Valley Electric Association, Engineering Conference, President Hotel, Kansas City, Mo.
10-11 Indiana Electric Association, Annual Young Men's Utility Conference, Ipalco Hall, Indianapolis, Ind.
11-13 Southeastern Electric Exchange, 18th Annual Conference, Boca Raton Club, Boca Raton, Fla.
15-18 Rocky Mountain Electrical League, Annual Spring Conference, Shirley Savoy Hotel, Denver, Colo.
16-18 EEI Transportation Committee jointly with AGA Motor Vehicle Committee, Peabody Hotel, Memphis, Tenn.
17-19 ASME, Process Industries Division Conference, Lord Baltimore Hotel, Baltimore, Md.
19 EEI Industrial Relations Committee, 420 Lexington Ave., New York, N. Y.
23-25 1951 Conference of Electric and Gas Utility Accountants, Hotel Sherman, Chicago, Ill.
25-27 Northwest Electric Light & Power Association, Engineering Section, Hotel Utah, Salt Lake City, Utah.
30-May 2—EEI Purchasing & Stores Committee Annual Conference, Lord Baltimore Hotel, Baltimore, Md.

MAY

1-2 EEI Transmission and Distribution Committee, Edgewater Beach Hotel, Chicago, Ill.
4 New Jersey Utilities Association, Spring Meeting, Seaview Country Club, Absecon, N. J.
7-9 Missouri Association of Public Utilities, Annual Convention, Jefferson Hotel, St. Louis, Mo.
7-9 Northwest Electric Light & Power Association, Business Development Section, Multnomah Hotel, Portland, Ore.
7-9 Joint Meeting, EEI Meter & Service Committee and AEIC Committee on Metering & Service Methods, Huntington Hotel, Pasadena, Calif.
9 EEI Commercial Electric Cooking Conference, Sheraton Hotel, Chicago, Ill.
16-18 Northwest Electric Light & Power Association, Personnel Section, Davenport Hotel, Spokane, Wash.
17-18 Missouri Valley Electric Association, Accounting Conference, President Hotel, Kansas City, Mo.
17-19 Public Utilities Advertising Association Annual Meeting, Hotel New Yorker, New York City, N. Y.
21-22 EEI Accident Prevention Committee, Hotel Utah, Salt Lake City, Utah.
21-23 Pacific Coast Electrical Association, Annual Convention, Biltmore Hotel, Los Angeles, Calif.
28-29 EEI Electrical Equipment Committee, Hotel Biltmore, Los Angeles, Calif.

JUNE

4 EEI Industrial Relations Committee, Denver, Colo.
4-7 EDISON ELECTRIC INSTITUTE, Nineteenth Annual Convention, Denver, Colo.
11-15 ASME Semi-Annual Meeting, Royal York Hotel, Toronto, Can.
13-16 ASCE Summer Meeting, Louisville, Ky.
18-20 Canadian Electrical Association, Annual Convention, Algonquin Hotel, St. Andrews, New Brunswick.
24-27 Michigan Electric Light Association Annual Convention, Mackinac Island, Mich.
25-29 ASME Oil and Gas Power Division Conference, Baker Hotel, Dallas, Tex.

AUGUST

27-30 Illuminating Engineering Society, National Technical Conference, Hotel Shoreham, Washington, D. C.

SEPTEMBER

9-12 Rocky Mountain Electrical League Fall Convention, La Fonda Hotel, Santa Fe, N. M.
10-14 Joint ASME Industrial Instruments & Regulators Division, and Instrument Society of America, Exhibit and Conference, Houston, Texas.
20-21 PIP Second Annual Workshop Conference, Edgewater Beach Hotel, Chicago, Ill.
24-26 ASME Petroleum Mechanical Engineering Conference, Hotel Mayo, Tulsa, Okla.
25-28 ASME Fall Meeting, Hotel Radisson, Minneapolis, Minn.

OCTOBER

1-2 Iowa Utilities Association, Management Conference, Fort Des Moines Hotel, Des Moines, Ia.
9-10 National Farm Electrification Conference, Gibson Hotel, Cincinnati, Ohio.
10-12 Indiana Electric Association Annual Convention, French Lick Springs Hotel, French Lick, Ind.
11-12 ASME Fuels—AIME Coal Conference, Roanoke, Va.
22-25 ASCE New York Convention, New York, N. Y.

EDISON ELECTRIC INSTITUTE OFFICERS AND COMMITTEES

OFFICERS

L. V. SUTTON, *President*.....Carolina Power and Light Co., Raleigh, N. C.
H. B. BRYANS, *Vice President*.....Philadelphia Electric Co., Philadelphia, Pa.
H. S. BENNION, *Vice President and Managing Director*...420 Lexington Avenue, New York, N. Y.
K. B. CRUMB, *Treasurer*.....American Gas & Electric Service Corp., New York, N. Y.
MAE B. WOODS, *Secretary*.....420 Lexington Avenue, New York, N. Y.

BOARD OF DIRECTORS

(Terms Expiring 1951)

J. M. BARRY,.....Alabama Power Co., Birmingham, Ala.
STUART COOPER .....Delaware Power and Light Co., Wilmington, Del.
GEORGE M. GADSBY.....Utah Power and Light Co., Salt Lake City, Utah
D. E. KARN.....Consumers Power Co., Jackson, Mich.
J. E. LOISEAU.....Public Service Co. of Colorado, Denver, Colo.
D. C. LUCE.....Public Service Electric and Gas Co., Newark, N. J.
PAUL B. MCKEE.....Pacific Power and Light Co., Portland, Ore.
C. B. MCMANUS.....Georgia Power Co., Atlanta, Ga.
S. C. MCMEEKIN.....South Carolina Electric & Gas Co., Columbia, S. C.
GROVER C. NEFF.....Wisconsin Power and Light Co., Madison, Wis.
P. H. POWERS.....West Penn Power Co, Pittsburgh, Pa.
HAROLD QUINTON .....Southern California Edison Co., Los Angeles, Cal.
J. B. THOMAS.....Texas Electric Service Co., Ft. Worth, Texas
JOHN T. WARD.....Boston Edison Co., Boston, Mass.
W. F. WYMAN.....Central Maine Power Co., Augusta, Maine

(Terms Expiring 1952)

W. C. BECKJORD.....The Cincinnati Gas & Electric Co., Cincinnati, Ohio
H. B. BRYANS.....Philadelphia Electric Co., Philadelphia, Pa.
H. C. CUMMINS.....Northern States Power Co., Minneapolis, Minn.
CHAS. B. DELAFIELD.....Consolidated Edison Co. of New York, Inc., New York, N. Y.
W. G. B. EULER.....Pacific Gas and Electric Co., San Francisco, Cal.
J. G. HOLTZCLAW.....Virginia Electric & Power Co., Richmond, Va.
F. C. KELLOGG.....Pioneer Service and Engineering Co., Chicago, Ill.
C. E. KOHLHEPP.....Wisconsin Public Service Corp., Milwaukee, Wis.
P. H. MCCANCE.....Duquesne Light Co., Pittsburgh, Pa.
R. E. MOODY..... ...Union Electric Co. of Missouri, St. Louis, Mo.
IRWIN L. MOORE.....New England Electric System, Boston, Mass.
A. T. O'NEILL.....Niagara Mohawk Power Corp., Buffalo, N. Y.
HAROLD TURNER .....The Ohio Power Co., Canton, Ohio
G. W. VAN DERZEE.....Wisconsin Electric Power Co., Milwaukee, Wis.
FRANK M. WILKES..... Southwestern Gas & Electric Co., Shreveport, La.

(Terms Expiring 1953)

A. M. BEEBEE.....Rochester Gas and Electric Corp., Rochester, N. Y.
C. P. CRANE.....Consolidated Gas Electric Light & Power Co. of Baltimore, Baltimore, Md.
E. W. DOEBLER.....Long Island Lighting Co., Mineola, L. I.
M. F. GILL.....Kansas Gas and Electric Co., Wichita, Kan.
N. B. GUSSETT.....Iowa Power and Light Co., Des Moines, Iowa
D. S. KENNEDY.....Oklahoma Gas and Electric Co., Oklahoma City, Okla.
L. M. KLAUBER.....San Diego Gas and Electric Co., San Diego, Cal.
R. H. KNOWLTON.....The Connecticut Light and Power Co., Hartford, Conn.
E. L. LINDSETH.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
H. E. MEADE.....New Orleans Public Service Inc., New Orleans, La.
J. W. PARKER.....The Detroit Edison Co., Detroit, Mich.
H. T. PRITCHARD.....Indianapolis Power and Light Co., Indianapolis, Ind.
K. M. ROBINSON.....The Washington Water Power Co., Spokane, Wash.
L. V. SUTTON.....Carolina Power and Light Co., Raleigh, N. C.
H. C. THUERK.....New Jersey Power and Light Co., Dover, N. J.

Executive Committee

W. C. Beckjord, C. P. Crane, C. B. Delafield, E. W. Doebler, R. H. Knowlton, E. L. Lindseth, D. C. Luce, P. H. Powers, and J. T. Ward.

EDISON ELECTRIC INSTITUTE OFFICERS AND COMMITTEES

(Continued)

ADVISORY COMMITTEE 1950-1951

D. C. BARNES.....Virginia Electric & Power Co., Charlottesville, Va.
E. F. BARRETT..Long Island Lighting Co., Mineola, N. Y.
S. R. BERTRON.....Houston Lighting & Power Co., Houston, Tex.
J. B. BLACK.....Pacific Gas and Electric Co., San Francisco, Calif.
GEORGE H. BLAKE....Public Service Electric & Gas Co., Newark, N. J.
B. F. BRAHENEY.....Northern States Power Co., Minneapolis, Minn.
PRENTISS BROWN..The Detroit Edison Co., Detroit, Mich.
CURTIS E. CALDER.....Electric Bond & Share Co., New York, N. Y.
J. W. CARPENTER..Texas Power & Light Co., Dallas, Tex.
A. H. KEHOE....Consolidated Edison Co. of N. Y., Inc., New York, N. Y.
H. P. LIVERSIDGE.....Philadelphia Electric Co., Philadelphia, Pa.
EARLE J. MACHOLD.....Niagara Mohawk Power Corp., Syracuse, N. Y.
T. W. MARTIN...Alabama Power Co., Birmingham, Ala.
J. W. MCAFEE.....Union Electric Co. of Missouri, St. Louis, Mo.
W. C. MULLENDORE....Southern California Edison Co., Los Angeles, Calif.
A. B. PATERSON.....New Orleans Public Service, Inc., New Orleans, La.
W. H. SAMMIS.....Ohio Edison Co., Akron, Ohio
WILLIAM SCHMIDT, JR., Consolidated Gas Electric Light & Power Co., Baltimore, Md.
PHILIP SPORN...American Gas & Electric Service Corp., New York, N. Y.
E. S. THOMPSON.....The West Penn Electric Co., Inc., New York, N. Y.
J. V. TONER.....Boston Edison Co., Boston, Mass.
J. R. WHITING....Consumers Power Co., Jackson, Mich.
E. A. YATES..The Southern Co., Inc., New York, N. Y.

CHAIRMEN OF EDISON ELECTRIC INSTITUTE COMMITTEES (1950-1951)

ACCOUNTING

Accounting Division Executive, RALPH H. SMITH.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Application of Accounting Principles, H. H. SCAFF.....Ebasco Services Inc., New York, N. Y.
Customer Activities, R. B. MCCRORBY.....Georgia Power Co., Atlanta, Ga.
Depreciation Accounting, A. E. BAUHAN.....Public Service Electric & Gas Co., Newark, N. J.
General Accounting, L. C. PROVENCHER.....The Detroit Edison Co., Detroit, Mich.
Plant Accounting and Records, C. E. RAINES.....Niagara Mohawk Power Corp., Syracuse, N. Y.
Taxation Accounting, C. WIGAND.....Commonwealth Services, Inc., New York, N. Y.

COMMERCIAL

Commercial Division General, M. E. SKINNER.....Union Electric Co. of Missouri, St. Louis, Mo.
Sales Personnel and Training, R. J. MILLER.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Wiring and Specifications, R. W. WILSON.....Kentucky Utilities Co., Inc., Lexington, Ky.
Commercial Sales Section, C. D. HOLLISTER.....Niagara Mohawk Power Corp., Albany, N. Y.
Farm Section, R. T. JONES.....Pennsylvania Power and Light Co., Allentown, Pa.
Industrial Power and Heating Section, ROBERT G. ELY.....Connecticut Light and Power Co., Hartford, Conn.
Residential Section, E. O. GEORGE.....The Detroit Edison Co., Detroit, Mich.

ENGINEERING

Engineering Division General, H. P. SEELYE.....The Detroit Edison Co., Detroit, Mich.
Electrical Equipment, J. H. FOOTE.....Commonwealth Associates, Inc., Jackson, Mich.
Hydraulic Power, G. J. VENCILL.....Union Electric Co. of Missouri, St. Louis, Mo.
Meter and Service, H. A. BROWN.....Rochester Gas & Electric Corp., Rochester, N. Y.
Prime Movers, F. P. FAIRCHILD.....Public Service Electric & Gas Co., Newark, N. J.
Transmission and Distribution, J. E. MCCORMACK.....Consolidated Edison Co. of New York, Inc., New York, N. Y.

GENERAL

Accident Prevention, W. T. ROGERS.....Ebasco Services Inc., New York, N. Y.
Codes and Standards, D. C. LUCE.....Public Service Electric & Gas Co., Newark, N. J.
Electric Power Survey, WALKER L. CISLER.....The Detroit Edison Co., Detroit, Mich.
Financing and Investor Relations, C. E. OAKES.....Pennsylvania Power and Light Co., Allentown, Pa.
Industrial Relations, S. F. LEAHY.....The Detroit Edison Co., Detroit, Mich.
Insurance, I. M. CARPENTER.....Ebasco Services Inc., New York, N. Y.
Legal, RALPH M. BESSE.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Membership, E. S. THOMPSON.....The West Penn Electric Co., Inc., New York, N. Y.
Prize Awards, G. E. WHITWELL.....Philadelphia Electric Co., Philadelphia, Pa.
Purchasing and Stores, H. E. HODGSON.....Wisconsin Power & Light Co., Madison, Wis.
Rate Research, HARRY I. MILLER.....Wisconsin Public Service Corp., Oshkosh, Wis.
Rural and Urban Development, G. R. KEEGAN.....Western Massachusetts Electric Co., Springfield, Mass.
Statistical, ELDRED H. SCOTT.....The Detroit Edison Co., Detroit, Mich.
Transportation, S. G. PAGE.....Duquesne Light Co., Pittsburgh, Pa.

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